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Volume 8 | November, 1943 | Number 2

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HITTING THE HIGH SPOTS

BECAUSE you, the readers of PRODUCTS FINISHING, are busy men, we are trying to help you by providing a digest of the articles in the current issue—hitting the high spots. A line or two here may call your attention to an article which contains just the information you need to solve a problem that's been troubling you.

"Fire," a word which puts fear into all of us, is the title of Jeffrey R. Stewart's article, written about a subject which is doubly important in wartime. The author pays special attention to fire hazards in the metal-finishing plant and the most efficient methods of fire-fighting.

Did you read Part 1 of the series "The Chemistry of Electroplating" in our October issue? If not, you'd better look it up, read it and then follow through with Part 2 on page 30 of this issue. You won't want to miss the information given on hydrogen.

The use of lapping and finishing compounds, which have been developed by abrasive manufacturers for application where fixed abrasives are not practicable, is a topic on which the author, Henry R. Power, is well qualified to write. We suggest you read the article over — you'll probably discover some facts you didn't know.

Materials, methods and designs change so quickly nowadays that it pays to keep up on the newest developments. A discussion of the differences between pickling brass and the new steel cartridge cases is given on page 48.

A picture story—read at a glance—depicts important wartime uses of zinc pigment paints. A lot of data is condensed ino four photos and four short paragraphs, but they may give you an idea that can be applied to production in your plant.

Have you been overlooking the Catalog Library section? It offers valuable literature and up-to-the-minute data on a wide variety of subjects, free for the asking.

NOVEMBER, 1943 Vol. 8, No. 2

FIRE

By JEFFREY R. STEWART

IN the year 1942, the loss from uncontrolled fires was $314,849,000, according to statistics furnished by the National Board of Fire Underwriters. Compared with any other value in America, this is a large sum of money to pay out for which nothing is received in exchange

except perhaps some bitter experience. At first, the reader may be slightly shocked to find that the writer believes that at least one beneficial effect usually is the result of a destructive fire. This advantage is the indelible horror it leaves on the mind of the victim, which, in turn, almost always results in greater care and the installation of preventive systems. Statistics have proved that the victim of a costly fire, or anyone who is "fire-conscious," is usually better equipped and has expended a considerable amount of time, money and effort to prevent a recurrence of disaster, as compared with a person or organization who ignores the inherent dangers of fire and explosion.

In the metal-finishing field, the consideration of fire is very important because nearly all of the protective coatings used are inflammable and, under certain conditions, rather explosive. This, of course, applies to liquid coatings before and during application, and not to the dried or hardened film. For this reason, it is necessary to know something about the general characteristics of the ingredients used in enamels and lacquers.

Usually, it is the solvent or thinner portion of the protective coating that is the greatest fire hazard. Nearly all of these are composed of organic solvents having a flash point ranging anywhere between 75 to 150 degrees F., with a large proportion having a flash point in the vicinity of 100 degrees F. The flash point test is really the only definite test which reveals numerical values which will give an indication of the danger or safety of the solvent. This laboratory method was explained in a previous issue of PRODUCTS FINISHING under the classification of the "Tag closed cup tester." Nearly all fire insurance companies, fire inspectors, interstate shipping organizations, postal authorities and fire underwriters use this method to determine the degree of fire hazard. Moreover, the flash point of a material is often used to determine the warning color of shipping labels, so that the men handling the shipment can exercise the necessary precautions.

Let us, at this point, observe the flash points of various solvents and thinners used either directly or indirectly in the metal-finishing industry:

Ether	— 40 deg. F.
Gasoline	— 10 to + 40 deg. F.
Acetone	15 deg. F.
Ethyl acetate	45 deg. F.
Benzol (benzene)	59 deg. F.
Toluol (toluene)	50 deg. F.
Xylol (xylene)	84 deg. F.
Turpentine	90 to 100 deg. F.
High flash naphtha	102 deg. F.
Butyl acetate	105 deg. F.
Butyl alcohol	115 deg. F.
Kerosene	150 deg. F.
Solvesso No. 1	60 deg. F.
Solvesso No. 2	86 deg. F.
Solvesso No. 3	136 deg. F.
Solvesso No. 4	170 deg. F.

Mineral spirits and V. M. & P. naphtha are not listed above because the flash point varies so widely between different petroleum refineries. In general, however, the flash point of the former is between 90 and 110 degrees F., and the latter usually ranges in flash point between 20 and 60 degrees F.

Minimize Future Losses

Unlike fire caused in domestic and commercial establishments, the cause of fires in industrial concerns is usually of a mechanical nature rather than the result of human error or carelessness. In general, it can be said that employees in spray shops and finishing rooms are pretty well aware of the hazard which exists. This is due, not only to the natural instinct of the person to prevent destruction, but also to the fact that a serious fire would mean the temporary or permanent loss of the man's source of income, to say nothing of

SUITABILITY OF LIQUID CHE

Class	Class 1 Soda and Acid Subdivisions A and B	Class 2 Compressed Gas
Class "A" Fires: Wood, textiles, paper, rubbish, general domestic risks.	Very suitable, inexpensive, and reliable if inspected regularly.	Very suitable, specially s where chemical action of th solutions might damage pic tures, leather, or other valu able and delicate articles Valuable where there is an danger of freezing. Quickly and easily recharged. Some what expensive.
Class "B" Fires: Alcohols, oils, varnishes, lacquers, synthetics, and so on.	Not well adapted for this class of risk.	Well adapted for this clas of risk, especially if carbo dioxide is used.
Class "C" Fires: Electrical machinery.	Not specially suitable.	Not specially suitable.
Class "D" Fires: Automobiles and gasoline engines.	Not specially suitable except for contents of trucks and so on, but subdivision "B" better than "A" owing to the risk of splashing over of acid in subdivision A.	Not specially suitable excep for contents of truck and s on. No danger of apparatu functioning through splash ing.
Class "E" Fires: Chimney fires.	Efficient, especially if used both up chimney from room and down chimney from roof.	Not specially suitable, bette from above than below.

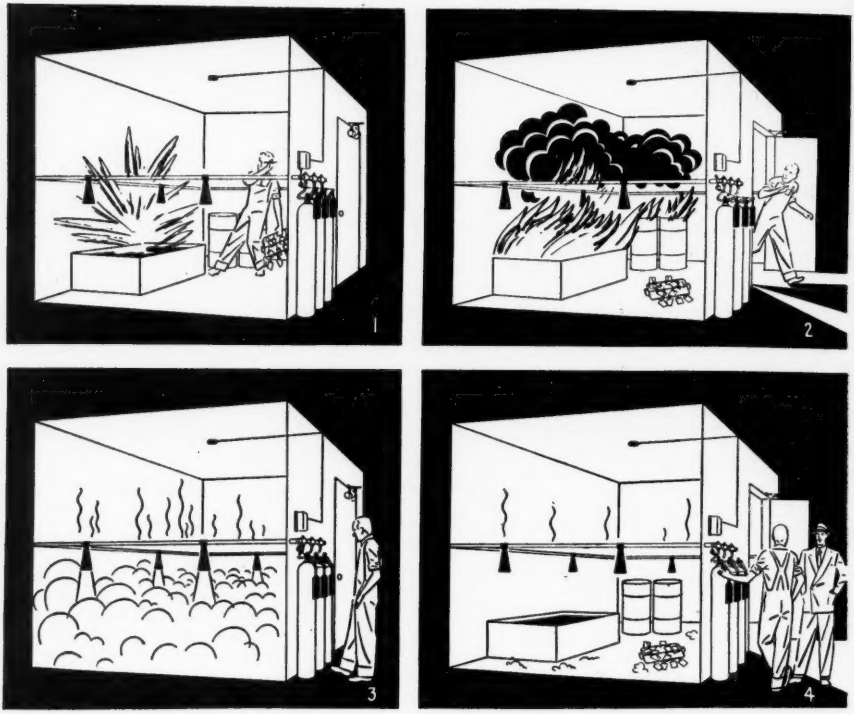
Fig. 1

MICAL FIRE EXTINGUISHERS

Class 3 Foam	Class 4 Carbon Tetrachloride Subdivisions C and D	Class 5 Methyl Bromide
Not specially adapted for fires of this class.	Not adapted for fires of this class, and should not be installed to cover general domestic risks, as the toxic effects of gases given off, more particularly if the liquid comes in contact with heated surfaces are dangerous, particularly in confined spaces.	Not very well adapted for fires of this class.
Well adapted to this class of fire, as even a 2-gallon appliance will cover a very large area with a complete blanket of dense foam. Used in conjunction with a mixture of bicarbonate of soda and sawdust to control flow of burning material; a very considerable fire can be dealt with.	Not very well adapted for this class of fire, but more efficient than Class 1 or 2.	Efficient when used as a directed horizontal spray.
Not specially suitable.	Best available for this class of fire. Particularly suitable for use on high-tension current machines, as the liquid is a non-conductor. Will not damage delicate machinery, such as switchboard gear, motor or generator windings, as the liquid is very volatile and has no rusting properties.	Particularly suitable for use on high-tension current machines, as the liquid is a non-conductor. Will not damage delicate machinery, such as switchboard gear, motor or generator windings, as the liquid is very volatile and has no rusting properties.
Very efficient, especially if whole engine becomes involved. Some danger of apparatus functioning owing to splashing.	Very efficient, especially for a carburetor fire or gasoline or oil burning under or around an engine. Dangerous fumes are given off if the engine is hot, and there is some risk of these being driven back into body of car.	Very efficient, especially for a carburetor fire or gasoline and oil burning around an engine.
Efficient if used both above and below. Fire in grate can be smothered out with this type.	Efficient if used from above and below.	Efficient if used from above and below.

Reprinted with permission from the National Paint Dictionary, 2nd edition.

Method of Extinguishing Enamel and Lacquer Fires with Carbon Dioxide

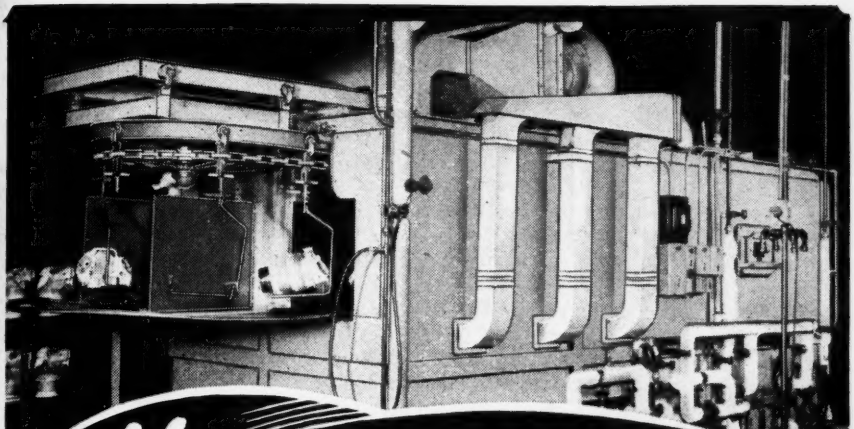


(Courtesy of MacNair-Dorland Publishing Co.)

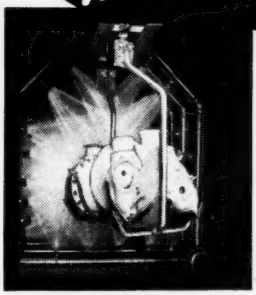
Fig. 2—The four stages of fighting a varnish or oil fire with carbon dioxide. (1) A "flash fire" starts in a flammable liquid in a room equipped with carbon dioxide extinguishers. (2) The only concern of the workman is to escape and avoid injury. Increase in temperature sets off the actuator on the ceiling which automatically opens valves on carbon dioxide cylinders where gas is stored. (3) Carbon dioxide rushes from nozzles and the inert gas envelopes the room and tank. Oxygen content of the air is reduced from normal 21 per cent to a point below which the fire cannot burn; that is, to 14 per cent or lower. (4) The fire is put out in 20 seconds, leaving no water damage or contamination of materials other than that caused by the heat of the fire itself.

the possibility for personal injury.

Many of the fires in industrial plants are caused by faulty mechanical devices or the lack of proper equipment to prevent fires. This statement is borne out by the fact that it is very seldom that we can sit down after a destructive fire and decide which individual is directly responsible for the loss. It is such things as static electricity, frictional sparks, use of non-explosion-proof electric motors, oily rags, defective electrical wiring, and poor housekeeping that causes most fires in industrial plants. With this information, one can then proceed to eliminate or minimize the possibility of fire losses by using the



How a Bomber Engine Plant CLEANS Aircraft Engine Cylinder Assemblies



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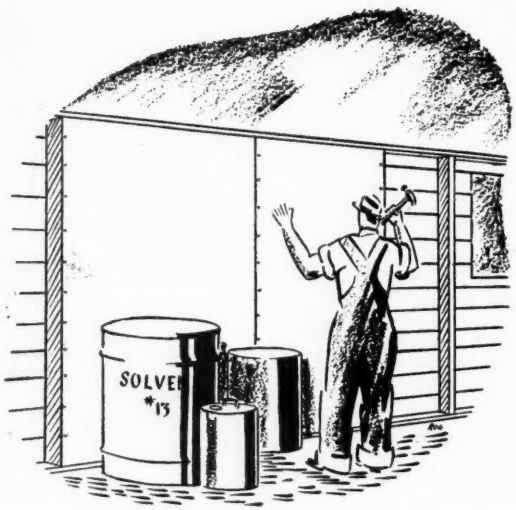

Fig. 3—Storage of petroleum products and lacquer thinners.

various preventive means.

Types of Fire Extinguishers

In general, we can classify fire extinguishers into five classes, although, of course, there are many more not listed because they are not of sufficient importance. There are also five different types of fires. Thus, by simple mathematics, there are 25 different combinations and considerations in extinguishing a fire after it has gotten out of control. Out of these 25 combinations, only 13 are satisfactory. This is shown in tabular form in the accompanying chart, Fig. 1. This chart should prove useful from the standpoint of reference material and is being posted on bulletin boards in various industrial plants to help educate the employees in the use of various types of fire extinguishers.

Varnish, Lacquer and Enamel Fires

Every employee should know that it is not advisable to use water to put out a fire in which varnish, lacquer, oil or gasoline is burning. But if you were to ask an employee which of the types of extinguishers was the most efficient, the chances are that he would lose this part of the quiz program. The use of compressed carbon dioxide has, in recent years, become very popular and can be considered the best of the types available. This means of fire fighting is not described in detail in the previous table, because this is a relatively new means of combatting fire.

The greatest advantage in using

Fig. 4—Minimum equipment for fire fighting.

A new method, developed by Hanson-Van Winkle-Munning engineers, for measuring the quantity of AVAILABLE ALKALI in cleaner baths, is only one of the valuable features covered in "Cleaners for Effective Metal Cleaning". Included also are operating suggestions, a section on metal cleaning processes, descriptions of Hanson-Van Winkle-Munning Soap and Alkali (both Soak and Electric) Cleaners, charts, graphs, and many helpful suggestions on the selection and control of alkali cleaners.

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compressed carbon dioxide is the fact that practically no contamination results from its use, and frequently the material which was once in flames can continue to be used after the fire is put out. This is effectively shown in the illustration Fig. 2. Note that the fire is divided into four stages and that it is extinguished automatically by means of automatic actuators. Such fires can be extinguished in about 20 seconds and thus eliminate the need to send in a fire alarm to the nearest fire department.

Figure 3 illustrates the point that petroleum products and lacquer thinners should be stored underground or in a separate building 75 feet from any other. The building should be lined with lathe and plaster or a fireproof material. The air must circulate to remove fumes.

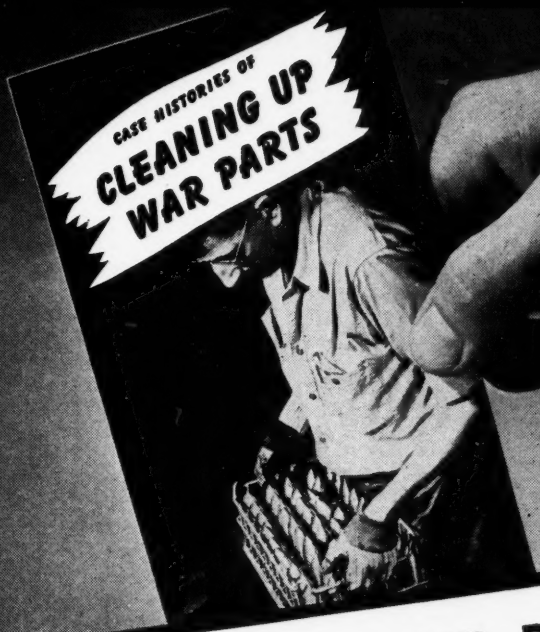
Fire Losses in 1943

It has already been pointed out that there is a substantial increase in the number of fires due to the wartime pressure exerted during 1942. But what about 1943? Donald Nelson of the War Production Board has revealed some figures that indicate 1943 will be a much more productive year than 1942, from a standpoint of war munitions and matériel. From this information, one can expect a proportionate increase from fire losses.

You cannot run a factory 24 hours a day without increasing the degree of hazards, as compared against running it 8 or even 16 hours a day. Since it is fair to assume that 1943 will result in greater losses, it is all the more important to impress the employees about certain safety measures to prevent fires. Another means of impressing employees regarding the importance of fire prevention is to post signs bearing statements such as the following: "The fear of fire in America has led the people to pay $635,000,000 per year in premiums to fire insurance companies, while $314,849,000 was returned to them to cover losses."

Blaze-Blitzing Jeep

A "blaze-blitzing" jeep designed to perform many of the duties of a regular fire engine is being used successfully by the plant protection force of Willys-Overland Motors, Toledo, Ohio. The fire-fighting car was built for quick dispatch to plant areas which cannot be reached by larger apparatus. It is equipped with a 500-gallon-per-minute pump which operates from the jeep's powerful 63-horsepower engine. In addition to carrying 375 feet of 2½-inch hose, the vehicle is also outfitted with two chemical fire extinguishers, spades, axes, rope and other standard fire-fighting equipment. It is operated by a three-man crew.



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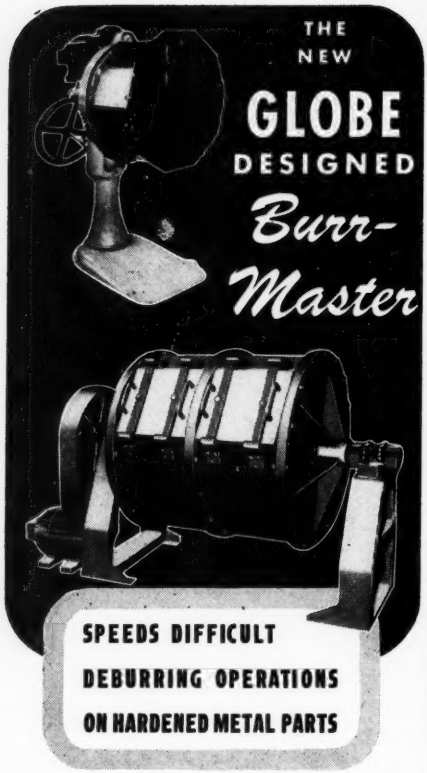

● The new Burr-Master Tumbling Barrels were originated by Globe to provide a more rapid means of cleaning and deburring today's tougher metal parts. The Burr-Master comes in two sizes. The Standard (top illustration) and the Senior (below). The Standard is equipped with a low speed, gearhead motor and is the tilting type for easy loading and unloading. The Senior is a double compartment, horizontal type with water-tight shells. The Senior is recommended where large quantities of parts are to be deburred. Write for new Burr-Master literature today.

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Information Available for Distribution to Employees

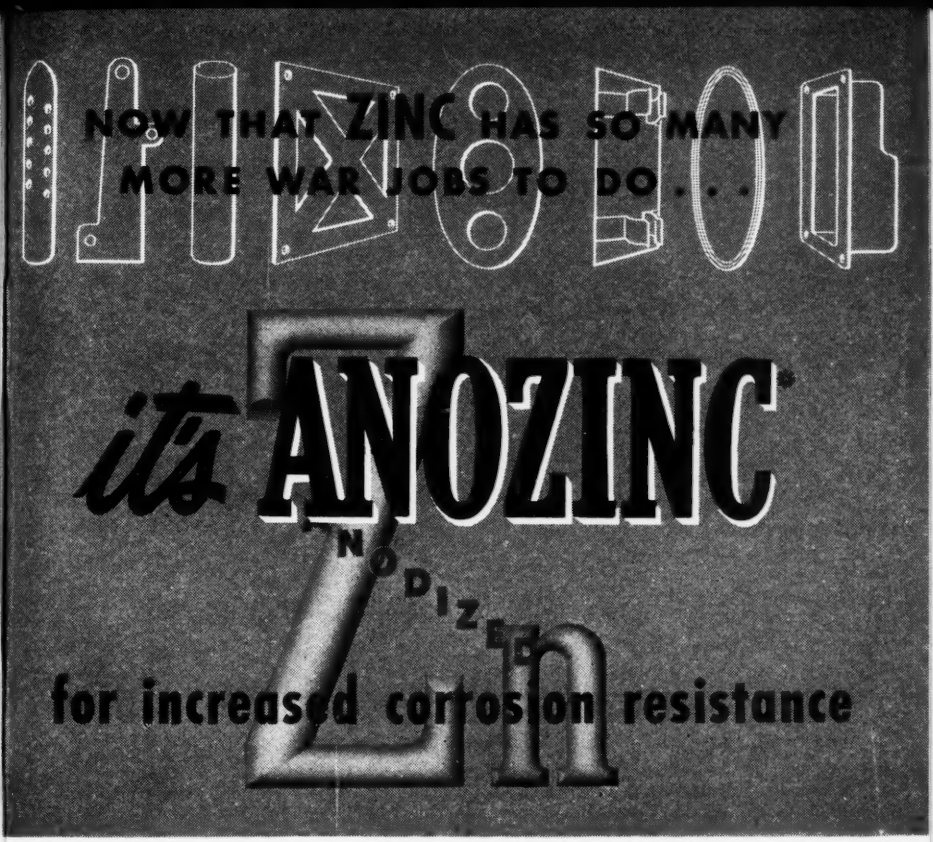
There are several sources of information and literature which can be used for distribution to employees, thus helping to minimize the danger of fire in the finishing plant. For this reason, it is not necessary to discuss this point here in greater detail. The National Fire Protective Association is the leader in this field, and publications are available at little or no cost to interested parties. The Office of Civilian Defense has also published some excellent pamphlets regarding fire prevention and means of combatting fires. These are available from the headquarters in Washington, D. C., free of charge. Local community groups in many industrial centers in America also provide such a service. Several manufacturers of fire extinguishers have done an excellent job of preparing and distributing to the industry helpful instruction manuals on the best methods of fighting fires.

Figure 4 shows the minimum equipment to be kept on hand at all times for fire fighting — buckets of water marked "for fire only," a ladder, rope, hose, an axe, and an extinguisher. Sand is important for use in smothering an oil or solvent fire. A water-moistened blanket is also effective, as is compressed carbon dioxide.

In conclusion, it can be said—"Fire protection is a combination of fire prevention, fire combatting and fire research."

(Illustration page 18 courtesy Walter Kidde & Co., Inc.)

Sarco Cooling Controls. Sarco Company, Inc., 574 Fifth Ave., New York 17, N. Y., has issued a 12-page bulletin, No. 700, on Sarco cooling controls. The bulletin covers self-operated temperature regulators and mixing valves for controlling cooling circuits on internal combustion engines, compressors, condensers, degreasers, stills, and so on. Completely illustrated, the bulletin includes many typical hook-ups, as well as capacity tables, prices, and so on.



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The Chemistry of Electroplating

By Dr. C. B. F. Young, Consultant

Part 2

IN an earlier issue the study of a very important element, oxygen, one that forms part of our water, was discussed. In this issue a study shall be made of the other component of water; namely, hydrogen. This element under natural conditions is a gas which is colorless, odorless, and tasteless, but it does not support combustion. It, however, will burn. It was found that oxygen occurred free in the atmosphere. Hydrogen does not occur in this manner. Illuminating gas contains about 38 per cent hydrogen, and the material is found in combination in many organic and inorganic compounds.

As has been stated, hydrogen combines with oxygen to form the well-known compound, water. If this is true, one should be able to decompose or tear down this compound and obtain from it hydrogen or oxygen. Thus, if a direct electric current is passed through an ordinary water solution, we find that hydrogen is released at the cathode while oxygen is liberated at the anode.

In the electroplating plant hydrogen is released in large quantities at the cathode in the plating of chromium. All electroplaters are familiar with this bubbling of gas which takes place during electrolysis. This material, as stated, is hydrogen. If one will observe the anode in a plating plant, it is quite easy to see that a gas is being liberated from this point. This gas is oxygen, the element which has already been discussed. In the plating of nickel from nickel sulfate solutions, a small amount of hydrogen is liberated at the cathode. The electroplater has to be very careful of this for, if allowed to be liberated in large quantities, the deposit becomes brittle and curls.

Hydrogen can be obtained from water by using very active metals such as sodium or potassium. If a piece of sodium is cleaned and put into water, immediately hissing and bubbling starts. Hydrogen is being liberated from the water in this case according to the equation below.

Water + Sodium = Hydrogen + Sodium Hydroxide

Many times the reaction will become so violent that the heat generated will set the hydrogen on fire, and the liberated hydrogen will burn with a characteristic yellow flame. If the material which is formed is examined, it will be found that the metal has displaced one-half of the hydrogen from the water. It combines with the other half of the hydrogen, plus the oxygen, to form a compound called sodium hydroxide, which is a material composed of sodium, hydrogen,

and oxygen. If one touches the water where the reaction has taken place with the fingers and rubs the fingers together, it will be noticed that the solution produces a slick feeling. This is characteristic of the compounds which one calls hydroxides.

If one desires to prepare hydrogen in the laboratory, it is not necessary to use a violent method. The best one to use is the action of the acids on certain metals. Acids are compounds which always have hydrogen present. A study shall be made of these interesting compounds later on.

The electroplater is quite familiar with many acids—for instance, sulfuric, hydrochloric, nitric, acetic acids, and many others. If we dilute some hydrochloric acid, which is also known as muriatic acid, with water and then pour over metallic zinc, a rather vigorous reaction results. If this is carried out in the apparatus as shown in Fig. IV, the hydrogen can be collected in bottles. The reaction which takes place may be represented as follows:

Zinc + Hydrochloric Acid = (Hydrogen and Chloride)
Hydrogen + Zinc Chloride (Zinc and Chlorine)

The product, zinc chloride, obtained by this reaction is left in the container "A." It is soluble in the solution, but if this is evaporated the compound may be obtained as a white solid. By observing the equation it will readily be seen that the zinc has been substituted for the hydrogen. This type of chemical change is known as displacement. It is possible to use sulfuric acid or acetic acid instead of hydrochloric acid. At the same time, other metals can be substituted for the zinc such as iron, aluminum, and so on.

Hydrogen is a colorless, odorless, and tasteless gas when pure. It is the lightest of all known substances. In fact, it is one-sixteenth the weight of oxygen. For this reason it is used to inflate balloons. It is very slightly soluble in water.

Hydrogen will combine with oxygen to form the compound, water. It has been pointed out earlier that oxygen will support combustion but will not burn. It can be proved that hydrogen, although it will burn readily, is not a supporter of combustion. Hydrogen unites with many compounds, thus it unites with chlorine to form hydrogen chloride. It also unites with sulfur to form hydrogen sulfide which is the material that smells like rotten eggs.

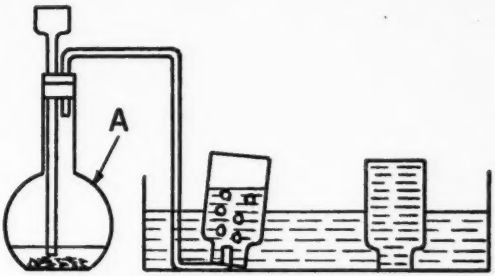

Fig. IV

Hydrogen has some very peculiar properties. As all electroplaters know, if allowed to be liberated from nickel plating solution, it will cause the nickel to curl away from the cathode and the resulting plate will be brittle. At ordinary temperatures it will not unite with oxygen from a practical viewpoint, but if heated to 800 degrees it unites with oxygen with great violence. This reaction can be made to take place at ordinary temperatures. Thus, if into a mixture of hydrogen and oxygen some finely divided platinum is introduced, the two elements combine with great violence. If the platinum is examined after the

reaction has occurred, it will be found that this material has undergone no change. It merely acts as a catalyst. The platinum in this case acted the same as did the manganese dioxide on potassium chlorate. The catalyst just hastens the reaction without itself being altered.

Hydrogen has an affinity for oxygen; that is, hydrogen likes to combine with oxygen when heated or at ordinary temperatures, provided a catalyst is present. Hydrogen will also combine with oxygen which is in combination; thus hydrogen will take the oxygen or unite with the oxygen that is present in copper oxide which is a black material. If an apparatus is constructed as in Fig. V, the tube charged with copper oxide and hydrogen passed over the hot copper oxide, soon the black copper oxide changes over to the characteristic red copper. The oxygen which is in combination with the copper will leave the same and unite with the hydrogen, forming water. The same is true if ferric oxide is used instead of copper oxide. This may be expressed as follows:

Ferric Oxide + Hydrogen =
(Iron and Oxy.)
Water + Iron
(Hyd. and Oxy.)

In the previous issue it was stated that when oxygen combined with materials, oxidation takes place. In the above gases the hydrogen has been oxidized. Now, if hydrogen is passed over a material which has been oxidized, we get what is called "reduction." In the above case, then, the copper oxide was reduced to copper and the iron oxide was reduced to iron. Therefore, it can be seen, that when oxidation occurs, reduction accompanies it. Reduction is derived from the verb phrase "to reduce."

Hydrogen is used to inflate balloons and dirigibles. Toy balloons filled with hydrogen will rise much faster than if filled with illuminating gas because hydrogen is the lightest material known. Hydrogen is used to produce artificial butter and lard. In this case the hydrogen is made to unite with oils which are thereby converted into solids. This is known as hydrogenation. When hydrogen is burned in oxygen, a very hot flame is produced. This is used to produce very high temperatures for the melting of platinum, irridium, and so on. One of the best uses for hydrogen at the present time is the synthetic nitrogen fixation. In this case the hydrogen is used in large quantities to combine with nitrogen forming ammonia.

When two cylinders containing two gases are placed together and are allowed to stand for a few minutes, it will be found upon examination, regardless of the weights of these gases, each will diffuse into the other in such a way that equal quantities of both gases will be found in both cylinders. As an example of this, if a cylinder containing hydrogen is placed over a cylinder containing chlorine and allowed to stand for a few minutes, it will be found that both cylinders contain a mixture which is equal in hydrogen and chlorine. This takes place regardless of the fact that chlorine is thirty-five times as heavy as hydrogen.

All gases have this locomotive power. The process by which small parts of gases tend to become uniformly mixed is called diffusion. The rates at which a gas diffuses into a particular gas are approximately inversely proportional to the square roots of their densities. As an illustration of the above law, it may be said that hydrogen will mix with air four times as rapidly as oxygen. Thus hydrogen, being the lightest known material, has the greatest speed of diffusion.

In order to explain the properties of gases, a theory has been worked out which is called the Kinetic Molec-

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ular Theory. This assumes the following: Gases are made up of exceedingly minute particles called molecules. Molecules of the same materials are all alike. If these molecules are in the gaseous state they are rather far apart, but if in the solid state they are comparatively close together. These little particles are constantly traveling at a high rate of speed in all directions. They travel in straight lines except when they hit each other and bound off. From this last statement it can be seen why gases diffuse so readily. When the small particles hit against the sides of a container, a force is produced which always has a tendency to push out the sides. This is known as the pressure of a gas. When a certain gas is heated, the small particles move about faster and in this way exert more of a pressure. From this it can be seen why two gases of unequal densities will mix very readily — for instance, hydrogen and chlorine. Although the latter is much heavier than the former, hydrogen moves much faster than does the chlorine.

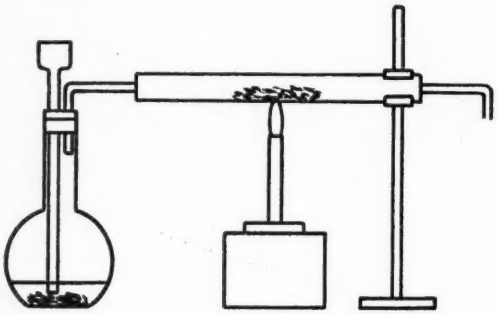

Fig. V

About five-sevenths of the earth's surface is covered with water. It exists as moisture in many components and substances. The ground has large quantities of moisture stored in it. Tomatoes are 95 per cent water, as is true with many other vegetables. The human body consists of about 70 per cent water. This material is important to the electrochemist because it is the medium by which electroplating is carried on. For instance, copper sulfate and sulfuric acid are dissolved in water, forming acid copper sulphate solution which is used for the electrodeposition of copper. The same is true of all other plating baths. Every one of them contains water as the liquid or solvent. For this reason it is very important that the electroplater becomes familiar with this interesting compound.

Water freezes or turns to solid at 0 degree C. (32 degrees F.), and boils or forms a vapor at 100 degrees C. (212 degrees F.). It is an odorless liquid and in small quantities, color-

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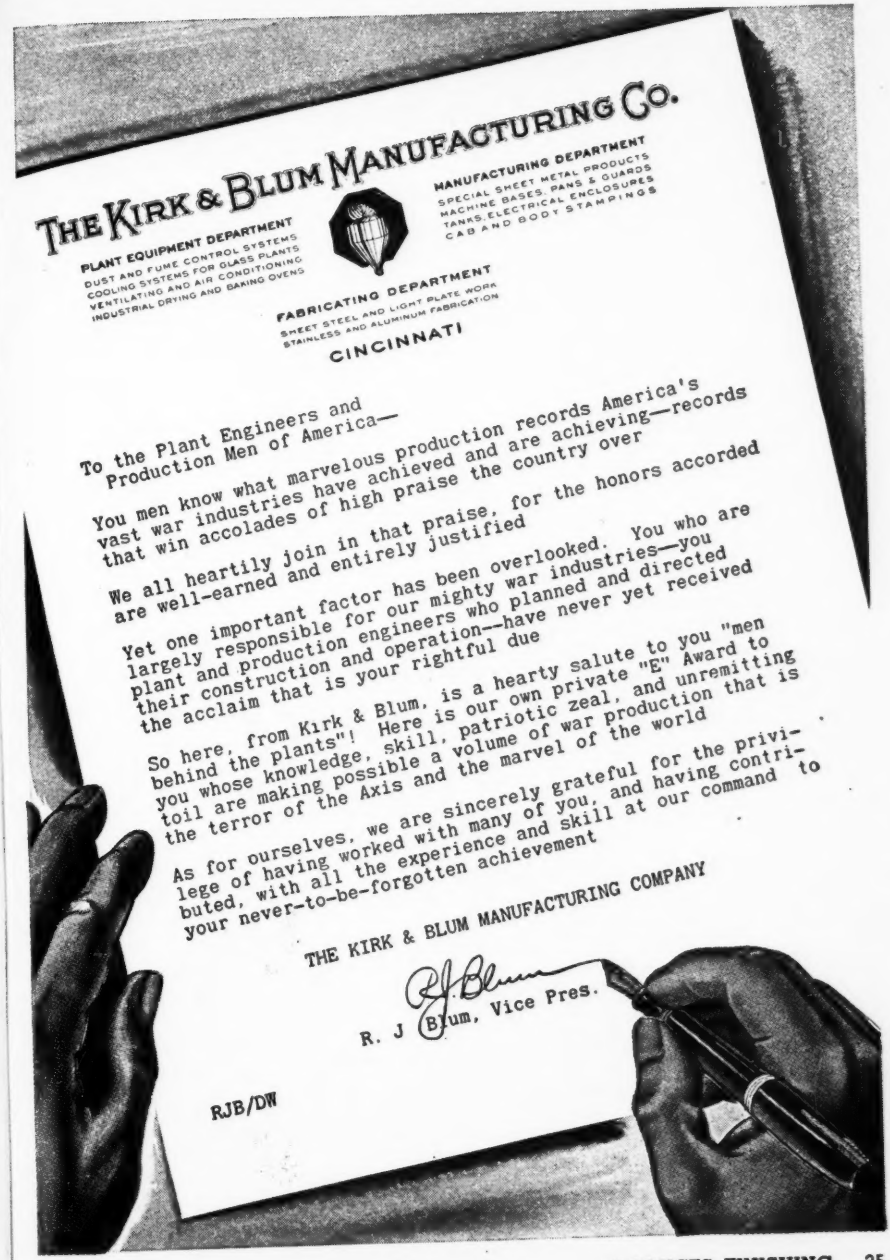

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So here, from Kirk & Blum, is a hearty salute to you "men behind the plants"! Here is our own private "E" Award to you whose knowledge, skill, patriotic zeal, and unremitting toil are making possible a volume of war production that is the terror of the Axis and the marvel of the world

As for ourselves, we are sincerely grateful for the privilege of having worked with many of you, and having contributed, with all the experience and skill at our command to your never-to-be-forgotten achievement

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R. J. Blum, Vice Pres.

RJB/DW

less, but large bodies of water produce a blue coloration. Water is different from most materials in that when it is cooled from 100 degrees C., the water gradually decreases in volume until 4 degrees C. is reached. At this point a given weight of water reaches its smallest volume, thus at 4 degrees C. one cubic cc. of water weighs one gram. Thus, it is possible by this, mass per unit volume, to define the heaviness or lightness of matter. Water is taken as the standard and is one. That is to say, one gram of water at 4 degrees C. weighs one gram. This may be expressed as follows:

$$\text{Density} = \text{Mass per Unit Volume}$$

$$\text{Density of Water} = \frac{1 \text{ gram}}{1 \text{ cc.}} = 1$$

In the electroplating shop many liquid chemical reagents are specified not by the density but by specific gravity. The specific gravity of a material is the relation of its density compared to the density of water. Thus the specific gravity of sulfuric acid is 1.86. This means that a given quantity of sulfuric acid is 1.86 times as heavy as water. This may be stated as follows:

$$\text{Specific Gravity} = \frac{\text{Weight of Mass of material considered}}{\text{Weight of equal volume of water}}$$

$$\text{Specific Gravity of } H_2SO_4 = \frac{1.86}{1} = 1.86$$

All of us are familiar with the fact that if the temperature drops below 0 degree C., water turns into ice and, also, if water is heated to 100 degrees C., steam is formed. The chemist knows this as a change of state. Therefore, water has three states of matter; namely, solid, liquid, and

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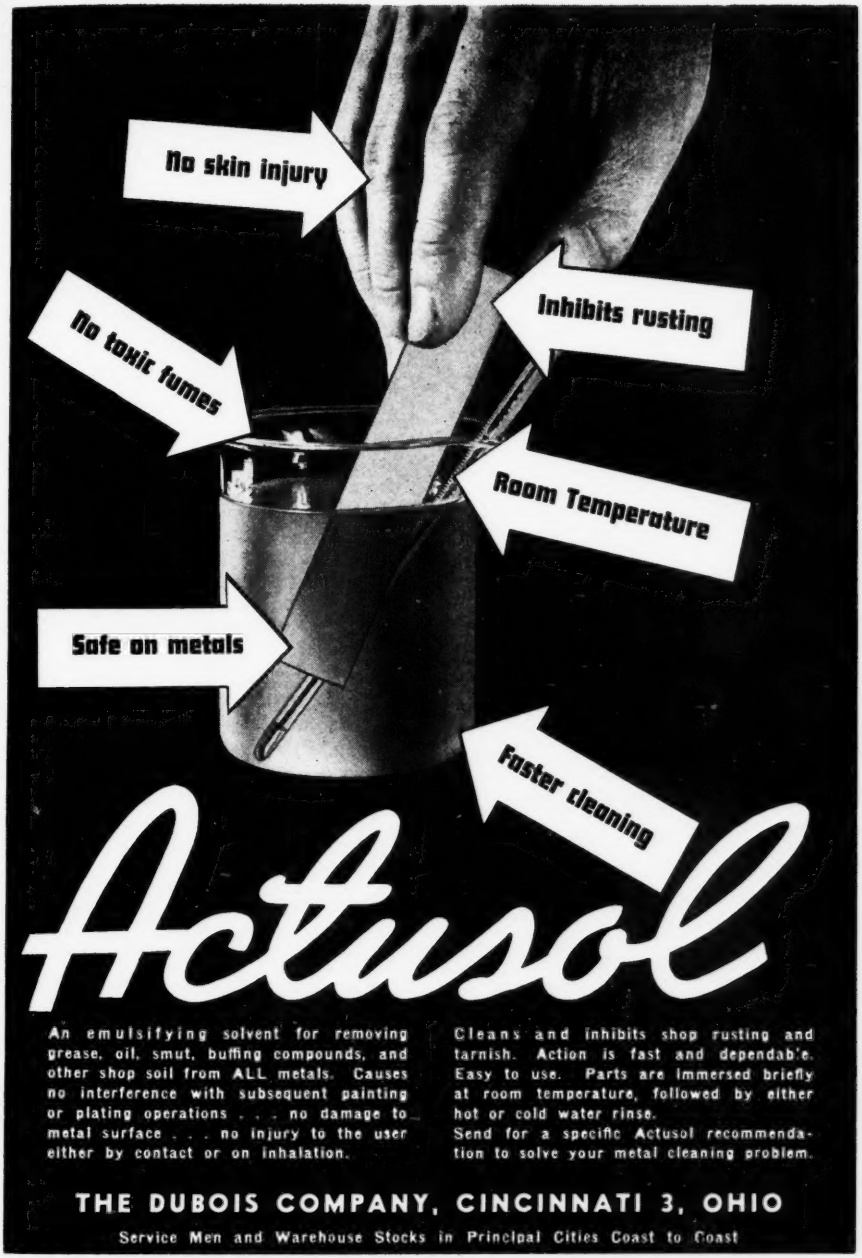

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gaseous. When water changes into steam or ice, no chemical change takes place; only a physical change results. Water is always passing to the gaseous state even if the temperature is below 100 degrees C. This process is known as evaporation.

The electroplater is quite familiar with the fact that the articles which have been plated and rinsed in water soon dry if hung in the air. This is due to the fact that the little particles of water slowly evaporate in the air, leaving the surface behind dry. It is also common knowledge that the water in a plating tank evaporates. Many times nickel sulfate will crystallize on the sides of a tank when the water evaporates and goes to a lower level. The higher the temperature, the faster the evaporation. When the evaporation becomes very rapid, and vapor or gas rises through the solution, the liquid is said to boil. The boiling point of a liquid depends upon atmospheric pressure. The lower the pressure, the lower the boiling point. In order to determine the boiling point of a liquid, the pressure must be taken into account. Thus, water boils at 100 degrees C. and 760 mm. of pressure. The temperature at which a material melts is called the melting point, and a temperature at which a material boils is called the boiling point.

Water will dissolve many materials—for instance, nickel sulfate, sodium cyanide, boric acid, ammonium chloride, and so on. The process of dissolving can be considered as a mechanical one. Water is used to dissolve many materials because it is cheap and when some materials (not all) are dissolved in it, the solution formed conducts an electric current. For these two reasons the electroplater always uses water as the dissolving material. The liquid which is used in preparing a solution is called a solvent. The resulting mixture obtained when water has dissolved a salt, for instance, is called a solution. An aqueous solution is a solution which is made up with water.

When water is electrolyzed, the material is broken down into its constituents. If it is possible to build up water from its constituents, a further check can be obtained on the composition of this material. If a definite volume of hydrogen and oxygen are united it will always be found that two volumes of hydrogen are required to unite with one volume of oxygen. This type of experimentation is known as "synthesis," which means "putting together." If the volume of oxygen required to unite with a given amount of hydrogen is measured, it will be found that two volumes of hydrogen plus one volume of oxygen equals two volumes of steam.

If water is decomposed, regardless of its source, it will always be found to consist of two volumes hydrogen to one volume oxygen. The same is true if any two specimens of hydro-

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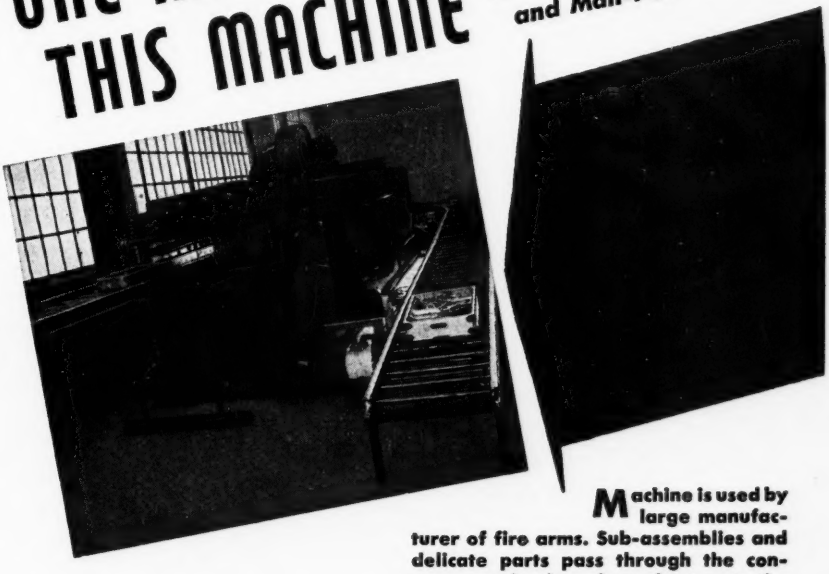

Machine is used by large manufacturer of fire arms. Sub-assemblies and delicate parts pass through the conveyor section in racks and return to the charging end on a roller conveyor. Small work, screw machine parts and similar work pass through the drum section and return to the charging end on a canvas belt conveyor.

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gen and oxygen are united. They always combine in this same ratio to produce water. If other gaseous reactions are investigated, it will always be found that the volumes of the gases used and produced in a chemical reaction can always be represented by the ratio of small whole numbers.

If one desires to determine the relative weights of the elements in a compound — for example, hydrogen and oxygen which combine to make water —the reaction of hydrogen and copper oxide can be used to advantage. Thus, if hydrogen is passed over a weighed amount of copper oxide and the water formed is weighed, the difference in weight of the copper oxide gives the weight of the oxygen used, and the difference in weight of the water formed and the weight of the oxygen is the weight of the hydrogen. If this experiment is performed it will be found that one part by weight of hydrogen combines with 7.94 parts by weight of oxygen to form water. If amounts of water present are desired, the experiment is called a quantitative one. If one does not desire to know the amounts but only the material present, a qualitative experiment results. In short, one may say that quantitative means how much, while qualitative means what.

There is also another compound of hydrogen and oxygen — namely, hydrogen peroxide—which differs from ordinary water in that two volumes of hydrogen unite with two volumes of oxygen. Above it was found that one part of hydrogen and 7.94 parts of oxygen by weight unite to produce water, but hydrogen peroxide contains one part by weight of hydrogen and two times 7.94 or 15.88 parts by weight of oxygen.

One of the best ways of manufacturing hydrogen peroxide is to unite cold dilute sulfuric acid with barium peroxide which may be expressed as follows:

Barium Peroxide (Barium and Oxy.) + Sulfuric Acid (Hyd., Sul. and Oxy.) = Barium Sulfate (Bar., Sul. and Oxy.) + Hydrogen Peroxide (Hyd. and Oxy.)

The barium sulfate thus produced is an insoluble white solid which settles out on the bottom of the container. Hydrogen peroxide is generally sold as 3 per cent solution in water under the name of peroxide or hydrogen peroxide. The material is used wherever a strong oxidizing agent is needed. It is used for bleaching cotton, silk, wool, and hair, as an antiseptic, a cleaning agent, and in nickel plating solutions to depolarize the cathode. Cathode polarization is caused by hydrogen, which is liberated during electrolysis. This film of gaseous hydrogen interferes with the process. Hydrogen peroxide is added to the plating bath so that the excess oxygen contained in this compound is liberated and, in turn, combines with the hydrogen, forming water. In this way a troublesome gas is removed, and the plater obtains a smooth deposit of nickel.

Part 3 will be published in our December issue.

Empire Black Pocket Manual. A simplified instruction form on the use of Empire Black oxide finish for steel has been designed and published by Empire Solvents Corporation, 170 Broadway, New York 7, N. Y., to help inexperienced workers handle black oxide finishes successfully. The manual, which is only 3½ x 3½ in. in size, contains a diagram and concise description of a typical tank layout for the Empire Black process. Copies of this handy pocket manual are available in any quantity to readers of PRODUCTS FINISHING.

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Lapping and Finishing Compounds

By HENRY R. POWER
The Carborundum Company, Niagara Falls, New York

PERHAPS the smoothest metal surface produced is that of the so-called "pancro"-mirror made by depositing aluminum on polished glass by means of evaporation in a vacuum chamber. Such a surface reflects light with 93 per cent efficiency and reflects all colors alike. A silver mirror reflects only 81 per cent with violet light. From this extreme of perfection, there are all the grades down to matte finishes required by ordinary commercial products.

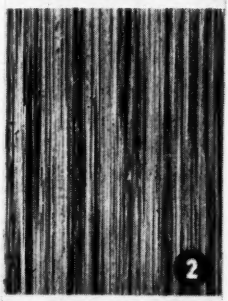
In most polishing shops adherence to a standard is measured by the visual comparison of the day's production with a "master" setup for the inspector's use. Because the biologist now tells us that what we see depends as much on the peculiar reactions of the eye as on the stimuli themselves, attempts have been made to eliminate visual inspection and determine the exact geometrical condition of a surface. If this can be done and expressed in mathematical terms, the fallible human judgment will no longer be exercised in passing upon the excellence of polish, the efficiency of types of abrasives, the degree of smoothness, and so on.

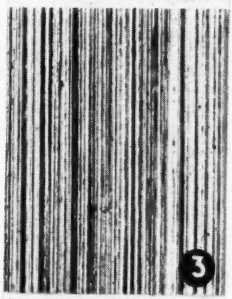
A critical method for examining surfaces is needed by those who measure tarnishing of polished surfaces, rates of corrosion, commercial processes like electroplating and protection of surfaces by commercial methods. Problems of lubrication, of friction, of impact, of high frequency noises are often those of the surface.

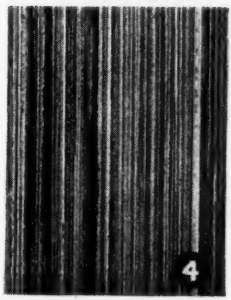
One method is to run the surface under a sapphire or diamond point pick-up connected to an amplifying system. This procedure yields sound waves, the pitch and regularity of which can be observed. Another method measures the reflective power of a surface by casting a beam of light on it and determining by means of a photoelectric cell the intensity of incident and reflected beams. As the polished surface moves under the beam, any microscopic hills and valleys will register as fluctuations in the electric cell due to variations in the reflected light. These methods reveal a "false" finish which may appear to be bright and glossy, but is actually due to light reflected by scratches.

Fixed abrasive stones of fine grit have been developed for improving the finish of metal bearing surfaces. These are used with an oscillating movement, with very light pressures and with very low abrasive speed.

There are many applications, however, where a fixed abrasive may not be practicable and for this use lapping and finishing compounds have been developed by the abrasive manu-







Microscopic sections illustrating the importance of finishing with the proper abrasive grain. Specimens are ball bearing raceways.

(1) Shows a surface ground with 120 grit grinding wheel.

(2) Same surface lapped with Silicon Carbide 320 grit, wood lap. Surface torn, having wide valleys and ridges.

(3) Same surface lapped with wrong kind of Aluminous Abrasive 150 grit and wood lap. Surface is torn badly.

(4) Same surface finished with 120 grit Aluminous Abrasive Cloth.

(5) Same surface lapped with 120 grit Aluminous Abrasive cloth and finished with 220 Aluminous Abrasive grain (dry). Leather lap. Time, 10 seconds. Higher finish conceals imperfections.

(6) Same surface lapped with W7 Med. finishing compound, wood lap. Time, 3 seconds. Not so high a finish as No. 5, but better in surface.

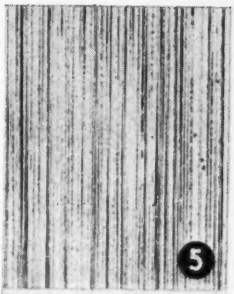
(7) Same surface lapped with W40 Med. finishing compound, lead lap. Time, 5 seconds.

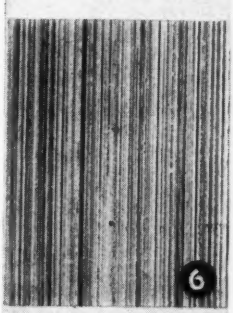
(8) Same surface lapped with W7 Med. Hard felt lap. Time, 4 seconds. Finish commercially perfect.

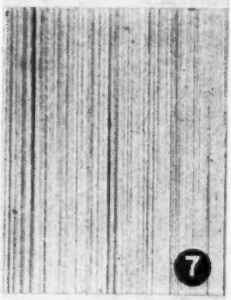
(All above surfaces lapped in one direction only. Magnification — 80.)

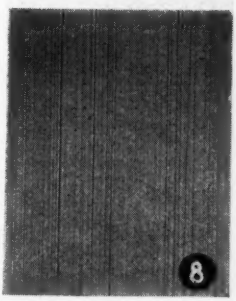
facturer. In these compounds the vehicle or carrier must meet with several requirements. It must be only slightly affected by temperature changes; must hold the abrasive grains uniformly separated in all directions; it must allow for speed of cut and at the same time prevent deep grain marks; it must be removed easily from the work at the conclusion of the operation.

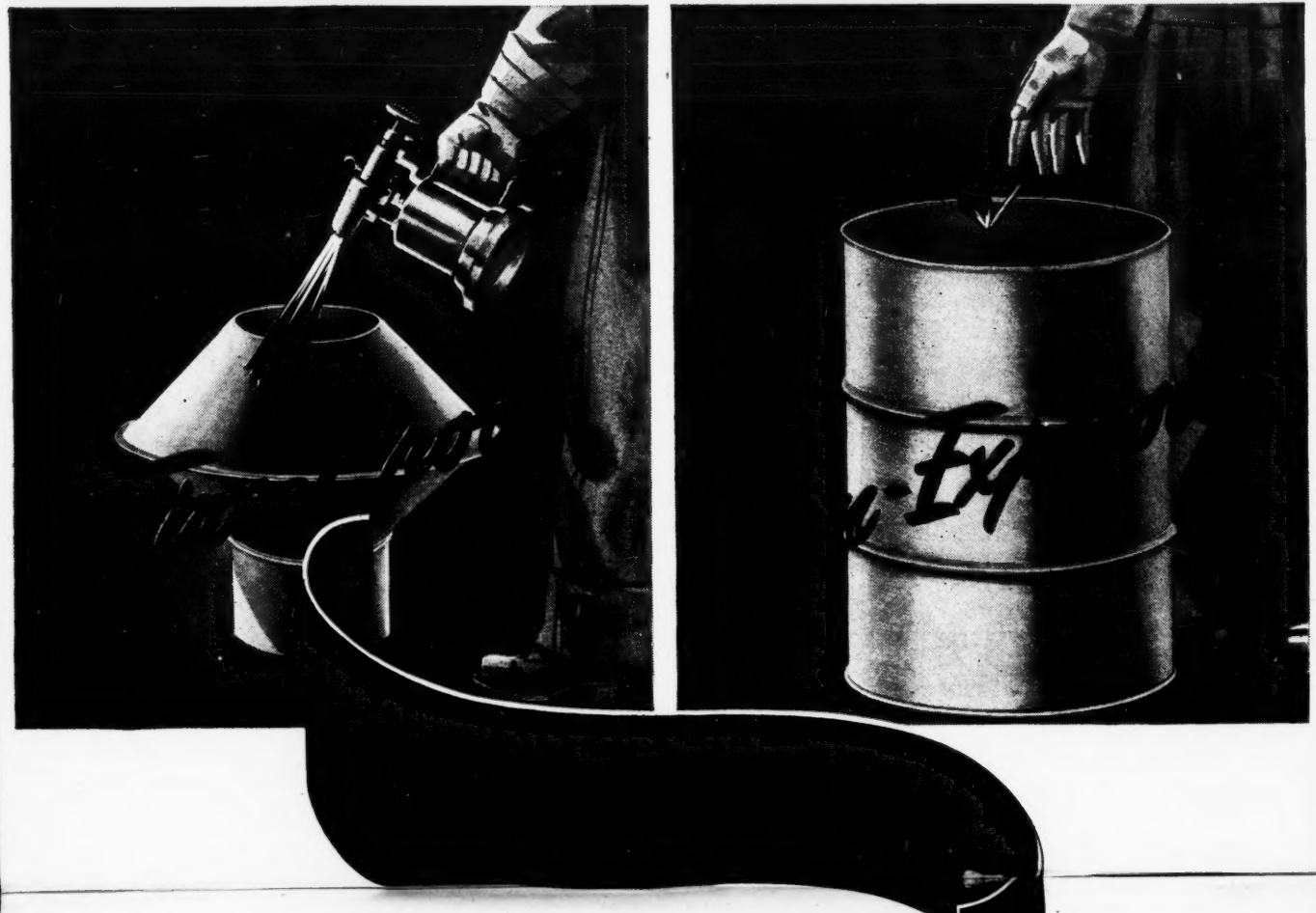
Another very important property of the compound relates to the detritus of fine metal produced in the finishing operation. This often is a fine film and difficult to remove from the work. By the proper choice of vehicle, however, it is now possible to wash off this metal film, along with the residual grit and ve-











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Although ceramic in nature, there is no comparison between **ARMOR-VIT** *and porcelain enamel, paint, lacquer or synthetic finishes. It is non-volatile, non-explosive. It withstands heat of over 1000° F., and is unaffected by the standard 200-hour salt spray tests, or weatherometer tests equal to 5 years normal weather.*

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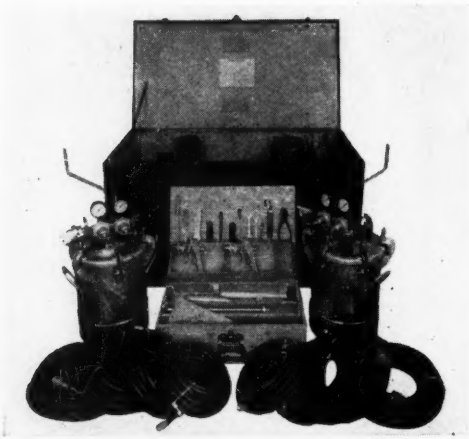
hicle, in a single operation. Important, too, is the fact that hot water may be used in place of the various solvents of a petroleum or chlorinated base.

Experiments have also shown that with one and the same abrasive grit used on an identical metal, a variety of finishes may be obtained, depending on the choice of vehicle. The proportion of vehicle to abrasive has been determined by extensive tests to insure maximum speed for obtaining the desired finish.

The abrasives used are silicon carbide, electrically fused Aluminum Oxide, levigated Alumina, and diamond powder selected according to the work to be finished. The sizes most generally used are the complete range from 60-mesh material to the fine product measurable only by the high-powered microscope measuring 10 microns or less.

In the use of finishing compounds, the material of which the lap is made has a decided influence on the speed, accuracy and finish of the work. The harder the lap, the slower the cut; the greater the accuracy, the duller the finish and the more rapid the wear on the lap. The porosity of the lap is also a factor; open grained cast iron works faster than steel or dense cast iron. A general rule is to use a lap softer than the work to be finished. For improved finish, greater speeds may be used but the work accomplished is slower. With softer laps, higher pressures may be used, but too high a pressure which may shatter the abrasive must be avoided.

The application of finishing compounds is in the field of gears—to remove cutter marks, imperfection of profile, spacing, and so on, and to correct distortion caused by heat treating. Dies used for drawing, casting molds, tungsten carbide tools, ball bearing raceways, sylphon seals, gages of various types, valves, bronze and babbitt bearings are some of the products now regularly finished in production shops with scientifically designed finishing compounds.



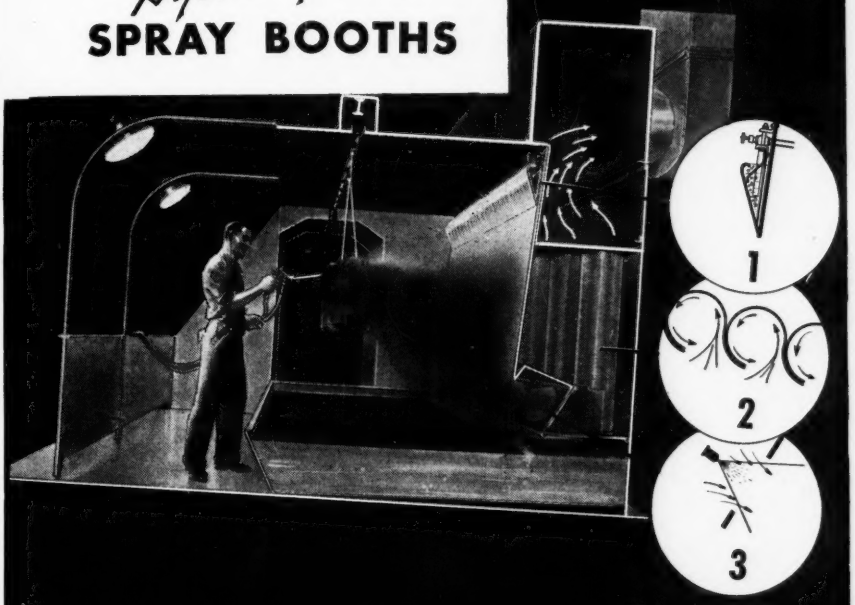
Paint Spray Outfits for World-Wide Use

Compact chest paint spray outfits of the type shown here are shipped to U. S. Army Engineer Depots throughout the world for use in camouflage work and for general maintenance painting. The entire output of Plant No. 2 of the Binks Manufacturing Company, Chicago, is given over to these units — assembly, processing, export boxing and shipping.

The unit illustrated contains two 5-gallon pressure material tanks, two spray guns, hose and all accessories for a two-man spray outfit, packed in a sturdy chest. A companion-piece is a sturdy wheelbarrow-type compressor outfit, weighing less than 225 pounds net, which is used to power the spray equipment and is of sufficient capacity to operate the two-man unit.

You can **SEE**
the advantages of

MAHON
Hydro-Filter
SPRAY BOOTHS



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Designers and Manufacturers of Metal Cleaning Machines, Rust Proofing Machines, Hydro-Filter Spray Booths, Ovens of All Types, Filtered Air Supply Systems, Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—Including Complete Finishing Systems

Pickling Steel Cartridge Cases

By A. JAMES LEHMAN, Asst. Production Manager
N. Ransohoff, Inc., Cincinnati, Ohio

IN a preceding article we presented some of the progress made in metal cleaning, with particular application to cleaning brass cartridge cases. Now, with the rapid change-over from brass to steel in manufacturing cartridge cases, new problems have arisen. The solution of these problems quickly, effectively and economically brooked no delays or uncertainties. Here was the situation and immediate response was emphatic and undeniable.

The immensity of the problem is indicated by the fact of which mention has been made previously that in 1942 we manufactured about ten and quarter billion rounds of small arms ammunition. With global warfare an actuality and the United States called upon to deliver the goods figuratively and literally to every part of the world, there could be no hesitancy or failure. As an example of what the production in 1942 really meant, one is appalled by the thought that 10,250,000,000 rounds of ammunition was five times as much as produced in

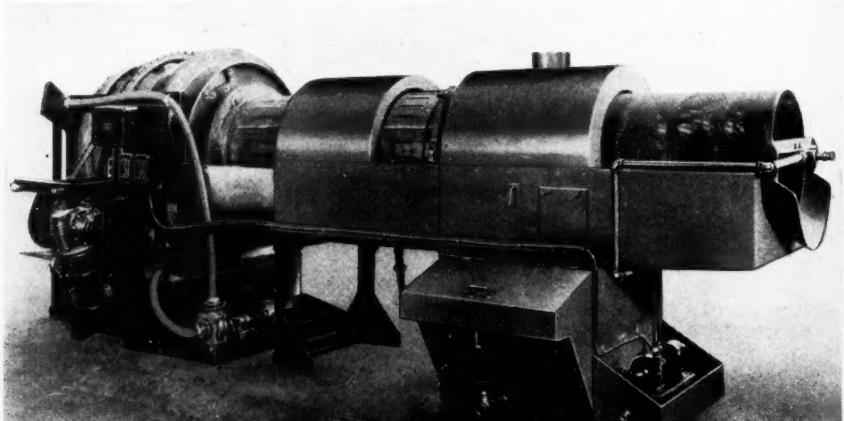

Fig. 1—The machine shown here was designed for pickling brass cartridge cases; however, it can also be adapted for steel cases if an atmosphere-controlled or bright anneal furnace is employed.

1941 and three times as much as the entire amount used in World War I. These figures are taken from President Roosevelt's annual message to Congress on January 7, 1943.

The use of steel instead of brass is no small change-over when you stop to think that since 1866 when the first all-metal cartridge was rolled out of brass strips (the drawing of cases was not developed until seven years later), brass has been used for the manufacture of cases. World War I was fought with brass. Today, however, the greatly increased fire power of our armed forces made imperative a substitute for the relatively rare copper. The hard logic of modern war insisted that American steel makers and cartridge case manufacturers find a substitute for brass.

It is not our purpose to describe the work of the individuals and industries who combined to solve this problem, for much of that is still a military secret. We are concerned here with one phase which can be told now—how the difficulties surrounding the pickling of steel cases were overcome, and how a technique was developed to do the job quickly and economically.

Pickling involves the removal of scale from the cases after anneal and before drawing. Scale is removed by rolling the cases in a sulfuric acid solution, rinsing them and then subjecting them to a neutralizing solution to halt the action of the acid.

To understand clearly the new problems raised by steel cases, let us review briefly one type of machine developed for pickling brass. This machine, shown in Fig. 1, consists of a cylindrical drum with spirals welded in place so that the material is carried through the drum as it rotates. The acid solution is brought into the drum by dip buckets which are attached to the outside of the drum and pick up the solution from the tank directly below. Within the drum, at each end of the pickling section, are discharge heads which maintain a constant level of solution but permit continuous circulation.

The actual pickling of the cases in this unit is accomplished by the combination of three factors: (1) the strength and (2) heat of the acid, and (3) the agitation of the cases brought about by the drum's rotation. It has been found that a 5 per cent dilute sulfuric acid solution, at a temperature of 140 to 150 degrees will remove the scale from brass cases when the drum is rotating at 3 to 5 r.p.m. The drum may be fabricated of molybdenum bearing stainless steel. This continuous pickling unit has, therefore, proved exceptionally satisfactory for the pickling of brass cartridge cases.

With the coming of steel cartridge cases, this pickling operation offers new problems. These difficulties are due to the fact that the scale produced by anneal on steel, unless an atmosphere-controlled furnace is used, is more difficult to remove than that produced on brass. If an atmosphere-controlled or bright anneal furnace is employed, and the amount of oxidation thus reduced, the scale on the cases is much lighter and the continuous machine just described may be used with good results. But, where an atmosphere-controlled furnace is not available—and in many cartridge case plants it is not—the pickling operation can only be consummated by increasing the intensity of the pickling by raising the concentration or the temperature of the acid, or by lengthening the time of the pickling cycle. Another important factor is the necessity of agitating the cases in the solution. Increasing this agitation will definitely speed up the pickling action.

It is here that the manufacturers of steel cases have discovered their pickling headaches. For neither of these alternatives mentioned in the

previous paragraph can be applied to the continuous drum-type unit used for pickling brass cases. If the temperature or the concentration of the sulfuric acid is increased, the cases will be properly pickled; but, unfortunately, so will the drum. The industry has already had several exam-

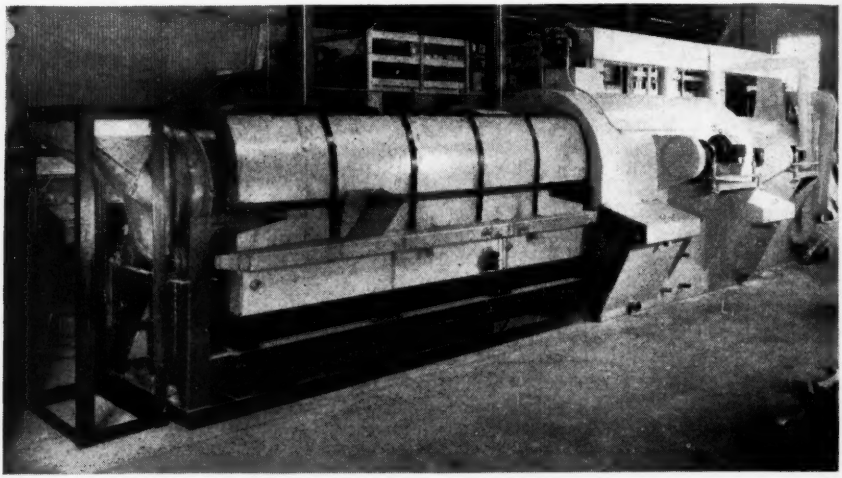

Fig. 2—Batch-type pickling unit developed especially for removing the scale from steel cartridge cases.

ples of acid-resistant metal drums which have fallen apart after a few weeks of use with a higher concentration or a higher temperature of the acid solution. To the best of this writer's information, there is no metal which will withstand this sort of acid application and, at the same time, be practical for fabrication into the type of drum required for a continuous unit. Also, it is not possible to increase the pickling time, for a slowing down of the drum's rotation will reduce the agitation of the cases, and increasing the length of the pickling section would make the unit far too bulky and space consuming.

To meet this problem, the batch-type pickling unit presented in Fig. 2, which thoroughly removes the heaviest scale from steel cases without the necessity of increasing the temperature or concentration of the acid, has been developed. The unit pickles the cases in an acid-resistant metal rolling drum. The cases are rolled in an acid solution until free from scale, and then are automatically discharged from the drum thru a special discharge head. This head holds the cases in the drum as long as it is rotating in a rolling direction, but automatically empties the drum as soon as the direction of rotation is reversed.

The drum is designed to maintain a continuous flow of acid solution onto the work, and follows the pickling operation with a water rinse while the cases are still in the drum. A tilting pan under the drum directs the acid back into a tank to be recirculated, and is tilted in the other direction while the cases are being rinsed so that the water drains to the sewer. When the direction of rotation

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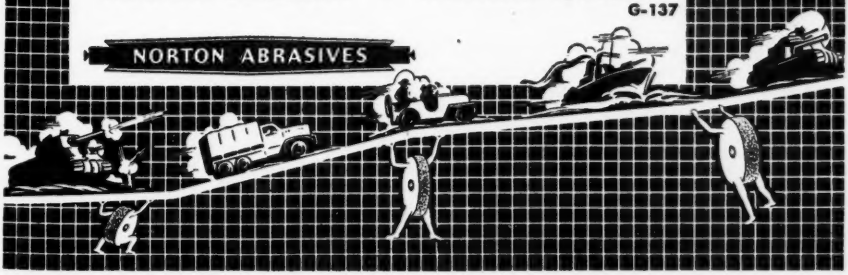

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is reversed, the cases pass out of the drum and are carried through a neutralizing bath. This unit may be controlled by time switches, which makes it completely automatic.

The cases are loaded into the drum and rolled in the acid solution until pickled. At this point (usually about 10 minutes after the start of the operation) the fresh water cuts in and the pan under the drum tilts so that the drum is drained into the sewer. After rinsing, the direction of the drum's rotation is reversed and the drum is automatically emptied and the cases carried into a holding drum where they are neutralized. They are carried through this drum by spirals welded in place. After neutralizing, the cases usually can be coated automatically with the drawing lubricant if the manufacturer so desires.

Emulsion Cleaning. The Enthone Co., New Haven, Conn., has issued a bulletin describing the Enthone emulsion cleaners. The cleaners are designed for rapid cleaning of all types of basis metals without attack and are recommended for cleaning of badly contaminated work. Four pages and an illustration are devoted to a description of the products and their use. Copy free upon request.

The G-E Cabinetrol, a simplified system for providing motor control for complex industrial processes, is the subject of a 24-page illustrated bulletin (GEA-3856) recently issued by the General Electric Company, Schenectady, N. Y. The publication describes how most control systems can be built up by combining standard control units and accessories into the required number of Cabinetrol sections. The publication also lists the many uses of the Cabinetrol, and explains in detail how the equipment is manufactured.

A section of the bulletin is devoted to a set of layout tables which show how simply most installations can be made, while another section lists the compartment sizes of the standard Cabinetrol units. Copy of Bulletin GEA-3856 free upon request.

AFTER SELECTIVE PLATING

Clean, Sharp LINES OF DEMARCATION

On Parts Which Were Masked With MICCRO - SUPREME STOP-OFF LACQUERS

Gear above was masked to permit silver plating of bearing surfaces only.

Part to right was masked for copper plating prior to carburizing. Gear teeth only were stopped off.

Miccro-Supreme Stop-Off Lacquers HR-302 (Red) and HB-401 (Black) are used for the masking of parts prior to selective plating. They provide exceptional adhesive qualities which assure a clear line of demarcation. They can, however, be quickly and easily removed, permitting thorough cleaning of all parts which have been coated. Because of their rapid air-drying qualities, time between coating and preparation for plating is reduced to a minimum.

These materials are perfectly neutral, containing no acids or other harmful ingredients, hence will not etch or stain the surface of precision lapped or super-finished parts. WRITE FOR FULL DETAILS.

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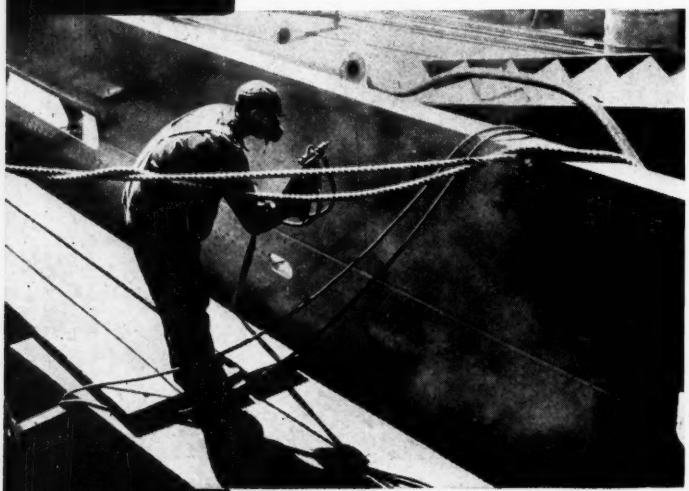
White zinc pigment paints diffuse sunlight and artificial light from the walls and ceilings of war plants—to increase lighting and production efficiency.

Zinc Paints in War

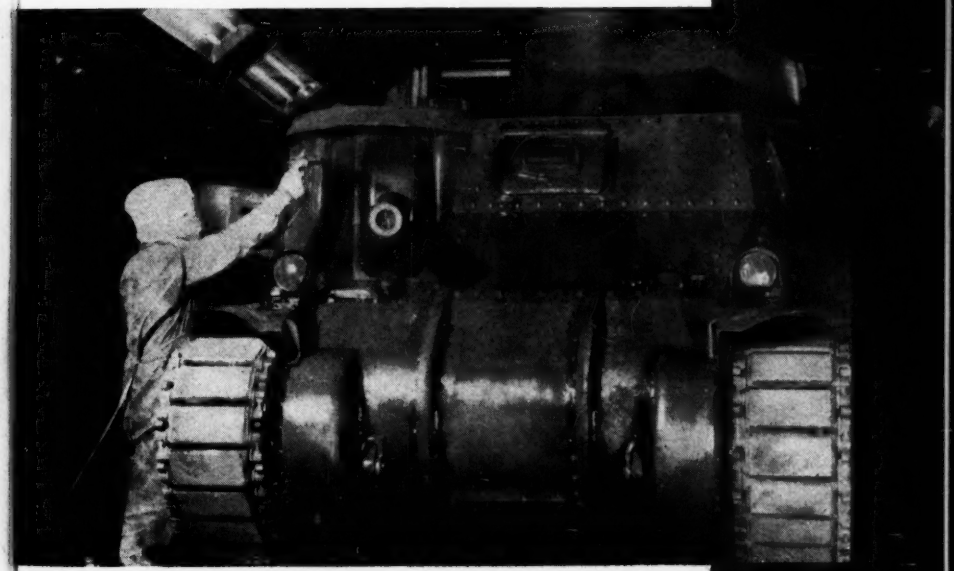


The Merchant Marine shipbuilding program demands large quantities of paint of all types — approximately 500 gallons for the hull and superstructure of a single Victory ship.

The paint coatings on shells serve two purposes; the paint protects the shell from corrosion, and the color identifies the type of explosive it contains.

Illustrations courtesy The New Jersey Zinc Company

Zinc chromate and zinc oxide are used in the priming coats applied on the exteriors of army tanks, providing the basis for an extremely durable finish.

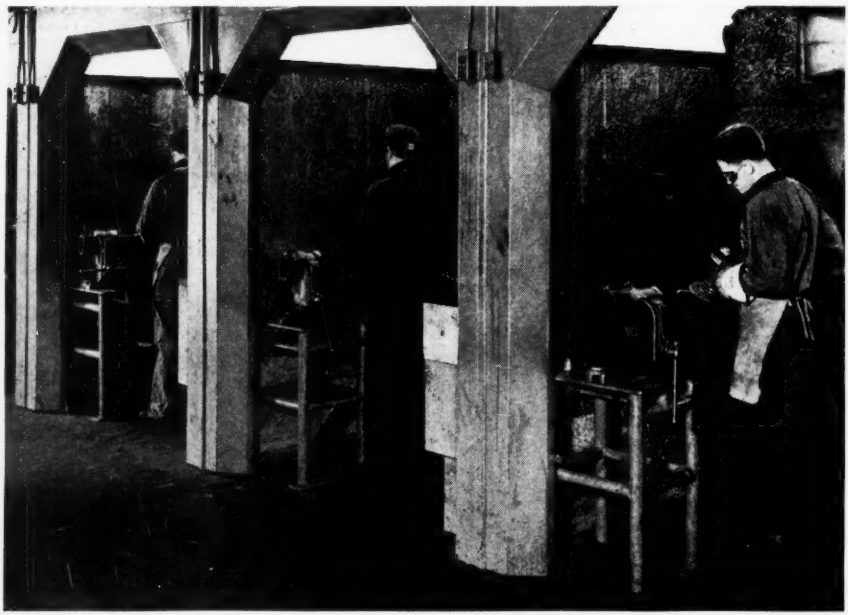


Finishing Facts

Individual Safety Booths Protect Aircraft Workers

A SERIES of specially designed booths perfected over a period of years for the safety and comfort of workers handling difficult and dangerous propeller finishing operations have been installed in New Jersey plants of the Propeller Division of Curtiss-Wright Corp. Nineteen of the new "safety booths" are now in operation.

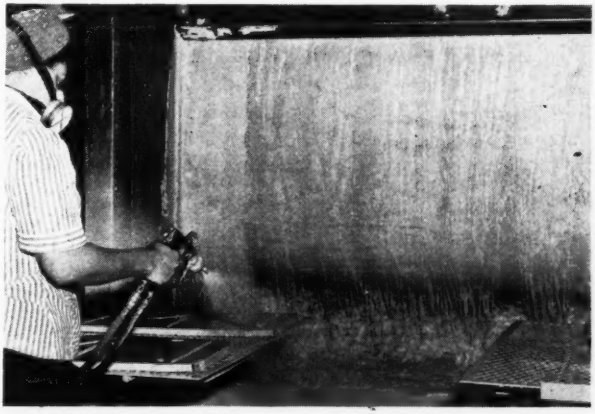
The individual safety booths, arranged in series with one operator to each unit, are air conditioned to carry off harmful dust particles, lessen workers' fatigue by cutting down noisy grinding operations, and practically eliminate hazards created by flying pieces of metal. They were per-



Operators are shown at work grinding and finishing Curtiss electric warplane propellers in specially-built safety booths installed by Curtiss-Wright Corporation's Propeller Division to decrease loss of man-hours through accidents. Made of non-priority material, they lessen strain on workers by reducing noise, are lighted to protect eye fatigue, and air conditioned to carry off harmful dust particles.

fected after more than three years of experimentation, as one of the many methods developed to increase output of Curtiss electric warplane propellers for the war effort.

The units, installed exclusively for grinding and polishing operations on hollow steel blades, are built of Thermax which is a non-priority, non-combustible material. Each booth is clean, comfortable and lighted by two 80-watt fluorescent lamps designed to reduce eye strain. A fan unit is installed at the rear of each booth to carry off dust and small injurious metal particles, while larger pieces of steel are thrown into a salvage hopper below. Passing workers are protected from flying particles by a baffle extending six inches from the interior of each booth.



Spray painting operation at Vultee Aircraft, Inc., showing a smooth, unbroken water curtain. The water is treated with Turco Deflocculator to prevent breaks in the watershed and, incidentally, improve the quality of recovered paint.

Propeller Division officials claimed the new safety booths have decreased the loss of man-hours through accidents and resulted in a speed-up in the production of Curtiss blades for American warplanes, such as the Republic Thunderbolt (P-47), Lockheed Lighting (P-38), Bell Airacobra (P-39) and the Curtiss Warhawk (P-40) fighters.

Turco Deflocculator Aids Paint Recovery

A NEW, important use in the War Production Board's paint recovery program was discovered recently for a chemical compound known as Turco Deflocculator—a development of Turco Products, Inc., 6135 S. Central Ave., Los Angeles, California.

It is reported that paint overspray collected from water wash curtain booths which used circulating water treated with Turco Deflocculator lent themselves better to recovery and produced a recovered paint of high quality, according to test runs recently made at the Southern California area reclamation factory.

When Turco Deflocculator was originally designed as a chemical treatment for circulating water systems in paint spray booths, its sole purpose was to prevent breaks in the water curtain by emulsifying oil and resinous vehicles and dispersing pigments so that they could not deposit on the metal walls of the spray booth.

Now, without changing the method or directions for using the compound, Turco Deflocculator serves a double duty. At the same time that the dilute solution of the compound (an initial charge of one-third ounce to the gallon of water, with further additions of one-sixth ounce per gallon every four hours) is acting to prevent breaks in

the water curtain and maintain an unbroken sheet, it also serves as a chemical recovery agent. By preventing the formation of scum on the top of tanks, Turco Deflocculator is said to aid in producing a high quality of sludge which stays smooth and is dispersed more easily after reclaiming.

Plating of Military Supplies

THE scarcity of metals such as copper, nickel, aluminum, and their alloys has led to the substitution of steel for many military supplies formerly made of these nonferrous metals. In most cases, the steel articles require protection against corrosion, which is frequently accomplished with electroplated coatings.

According to William Blum, chief of the Electrochemistry Section of the National Bureau of Standards, relatively little nickel plating is now applied. Cadmium plating is extensively employed on fuse parts and airplane fittings, but zinc is substituted wherever possible. Lead plating is being used to an increasing extent, and chromium and silver platings find many applications.

Camp tests on plated steel tableware show that resistance to abrasion is more important than protection against corrosion. Chromium coatings directly on case-hardened steel are useful on both tableware and mess trays.

The plating of military equipment has absorbed the full capacity of most of the plants formerly engaged in civilian supplies.

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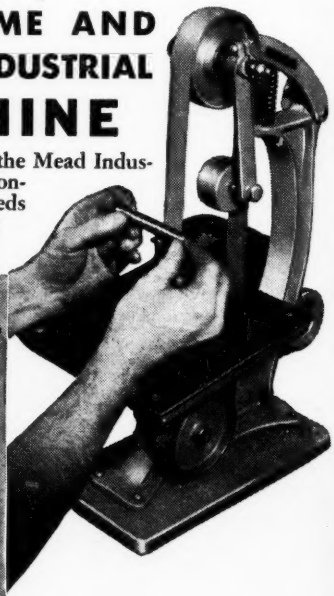

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THIS manufacturer had used Du-Lite for several years with excellent results. Regular production was maintained in the finishing department and the finishing cost was low.

Then he decided to change to another product, not because he expected a better finish, but because this other material cost less per pound. He made the change and the trouble started.

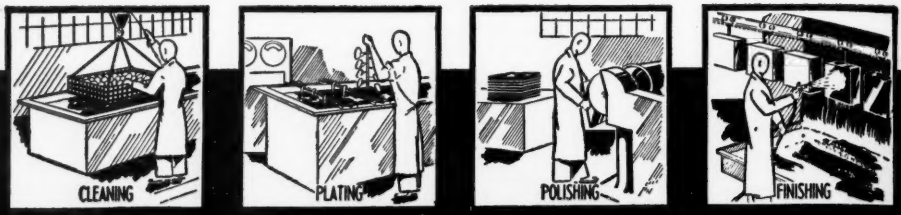
An urgent phone call was our first information that the manufacturer had made a change and was in trouble. Then he told us the story. He could not make the new material work satisfactorily. Production had been held up for more than a week. He had tried to get help from the supplier—no luck. Worried and disgusted, he called on Du-Lite.

Du-Lite salts were delivered within two hours and a Du-Lite representative was on hand to get things going. The processing tanks were emptied and cleaned. New solutions were made up with Du-Lite and regular production finishing started. We have our old customer back—for keeps.

Du-Lite is more than a chemical process. It is the "know-how" gained by research and experience as specialists in steel finishing. You are invited to take advantage of this "know-how" in connection with your individual problems.

Why not write, wire or telephone today? An experienced representative will call promptly and make recommendations to solve your problem.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT



News of the Industry

Bryant Named Ceramic Research Director

E. E. Bryant, who has been associated with Ferro Enamel Corporation, Cleveland, Ohio, for seven and one-half years as a member of the research staff, has

E. E. Bryant

been named ceramic research director, according to recent announcement. Mr. Bryant will be directly in charge of all problems relating to ceramic research, according to Dr. G. H. McIntyre, who is director of research for the company. Mr. Bryant graduated from Alfred University in 1931 as a ceramic engineer. He was associated with the Lisk Manufacturing Company, Canandaigua, N. Y., before joining Ferro.

Ault & Wiborg

Effective September 1, 1943, Ault & Wiborg Corporation, a subsidiary of Interchemical Corporation, became the Ault & Wiborg Division of Interchemical Corporation, 350 Fifth Ave., New York 1, N. Y. In the interests of corporate simplification, it was found desirable to transfer to Interchemical Corporation, the sole stockholder of Ault & Wiborg Corporation, the business and assets of Ault & Wiborg Corporation. The business will be carried on without change in management or other personnel.

New Wrinkle Plans Technical Conferences

To further increase its service to its licensees and users of wrinkle finishes, New Wrinkle, Inc., Dayton 2, Ohio, has inaugurated a program of regional technical conferences on formulation and production problems. The conferences will be held at determined intervals in cities throughout the country that offer a straetgic advantage for easy attendance on the part of licensees.

The conferences will be under the direction of William A. Waldie whose extensive background as technical director of New Wrinkle, Inc., provides an unusual degree of experience to draw upon in coping with wartime finishing needs under material restrictions and in looking to the future.

Licensees in each region will be notified in advance to send technical representatives from their manufacturing and

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The MODERN BLACK FINISH for STEEL

The superficial coloring but a durable Discriminating manufacturers, ☆ Discriminating manufacturers, engine parts! ☆

Not just a surface. ☆ Weapons, instruments, Pentrate Process.

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Protective penetration—that's Pentrate. Not just a superficial coloring but a durable finish that penetrates the surface. ☆ Discriminating manufacturers, engine parts! ☆

Black finish to produce the last possible items, use the patented Pentrate Process. Weapons, instruments, offering protection and friction reduction

anxious propeller blades and maintained with close assemblies.

steel propeller maintained and close assemblies.

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Tolerances to bearings and close assemblies.

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service departments to the meetings to obtain up-to-the-minute information that will enable them to better serve their customers.

Manager of Engineering Service Appointed

Miller G. Robinson has been appointed manager of engineering service of the Paint Division of Aluminum Industries, Inc., Cincinnati, Ohio, according to an announcement made by M. M. Carmody,

Miller G. Robinson

sales manager. A veteran of the industry, Mr. Robinson brings with him to his new position a background of 34 years of experience in paint engineering, service and sales work. For several years prior to joining Aluminum Industries, Mr. Robinson was affiliated with the Thresher Varnish Company of Dayton, Ohio, division of Pittsburgh Plate Glass Company, in a sales engineering capacity. In his present position Mr. Robinson will be in charge of all paint engineering service for Aluminum Industries.

Changes in Norton Staff

Leroy K. Behr has been appointed district manager in Philadelphia for the Abrasive Division by Norton Company, Worcester, Mass., succeeding the late Allan Seymour. Mr. Behr has been with Norton Company for 16 years, first in the sales engineering department at Worcester and then as abrasive engineer in England. For the last three years he has been abrasive engineer for eastern Massachusetts and Maine, with headquarters in Boston. The district under the supervision of the Norton Philadelphia branch includes southeastern New York, New Jersey, eastern Pennsylvania, Delaware, eastern sections of Maryland, and West Virginia, North Carolina, South Carolina, and eastern Tennessee.

John C. Ewer, who has been abrasive engineer for Norton Company for western Massachusetts, Rhode Island, Vermont and New Hampshire takes over Mr. Behr's former territory and is in turn succeeded by C. Barnard Price, Jr., who has been field engineer in New England.

A.E.S. Regional Meeting

A regional meeting of the Indianapolis, Anderson, Cincinnati and Dayton branches of the American Electroplaters' Society has been arranged for Saturday evening, November 6, 1943, at the Miami Hotel in Dayton, Ohio.

The general technical meeting will follow a dinner at which the principal speaker will be Dr. Gustav Egloff, president of The American Institute of Chemists and director of research of Universal Oil Products Company, Chicago. The author of nearly 500 technical articles and the holder of several hundred patents, Dr. Egloff is considered one of the world's outstanding authorities in the cracking of petroleum for the production of gasoline and other petroleum products. His address will be on "A World at War and the Postwar Era."

The Dayton branch is sponsoring the meeting and has extended an invitation to all members of the engineering and technical societies in the region to attend.

Additions to Park Chemical Staff

The Park Chemical Company, Detroit, Mich., announces the recent appointment of Richard Hammerstein and T. J. Clark to its engineering staff.

Mr. Hammerstein has been associated with industrial metallurgy, both in the research and experimental divisions, of the Carnegie Illinois Steel Corp., The Crucible Steel Co. of America, and Oldsmobile. Mr. Clark has specialized in heat treating, having held positions with R.C.A. Manufacturing Company and the

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Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 Boxes.

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Prices F.O.B. Factory, Philadelphia—Any Quantity! Order Today—Write, Wire or Phone.

AMERICAN METAL WORKS, INC.

1532 GERMANTOWN AVENUE **PHILADELPHIA 22, PA.**

Brown Instrument Company. Both men will be service engineers in the heat treating division of Park.

New Manager of G-E Transmitter Division

C. A. Priest has been appointed manager of the Transmitter Division of the General Electric Electronic Department, according to an announcement by Dr. W. R. G. Baker, vice president in charge of the department. In this capacity, Mr. Priest will assume the responsibility for the operations of the Syracuse, N. Y., plant of the division and will have his headquarters in that city. Mr. Priest was engineer of the Radio Transmitter Engineering Division at Schenectady before his new appointment. He has been associated with General Electric Company in various capacities since 1922.

Berwind Elected Director of Pennsalt

The Pennsylvania Salt Manufacturing Company, Philadelphia, Pa., announces that its Board of Directors has elected Charles G. Berwind as a director of the company to fill the vacancy caused by the death of William M. Potts. Mr. Berwind is vice president and director of the Berwind-White Coal Mining Company and is also a director of The Pennsylvania Company for Insurance on Lives and Granting Annuities and of the Philadelphia Orchestra Association.

Stuart Heads Westinghouse Lamp Division

Appointment of Ralph C. Stuart as manager of the Lamp Division of the Westinghouse Electric and Manufacturing Company, with headquarters in Bloomfield, N. J., was recently announced. Mr. Stuart, who has been with the Westinghouse Electric and Manufacturing Company and the Canadian Westinghouse Company for 25 years, will have charge of all activities of the Lamp Division, including sales, illumination engineering, district office activities of the division, as well as manufacturing and engineering in the division's five plants in New Jersey and West Virginia.

Changes in Quaker Chemical Organization

Quaker Chemical Products Corp., Conshohocken, Pa., announces the death on August 28 of Harold G. Hobbs, a metal process engineer. Mr. Hobbs joined the Quaker organization in March, 1941, and at the time of his death was a district manager in Cincinnati and the surrounding area.

C. O. Judd, who has been representing Quaker as a metal process engineer in Chicago, Ill., has moved to the Cincinnati post left vacant by Mr. Hobbs' death. Another Quaker process engineer, M. A. MacKay, formerly located in Syracuse, N. Y., is now representing the company in Chicago.

J. J. Topolinski New Works Manager at Skilsaw

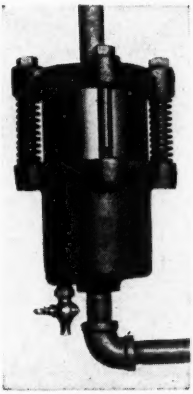
The appointment of J. J. Topolinski as works manager of Skilsaw, Inc., Chicago, Ill., was recently announced by Bolton Sullivan, president. Mr. Topolinski succeeds L. E. Parker, vice president, who has resigned from the company because of the ill health of his wife. Mr. Topolinski has been associated with Skilsaw 11 years and, until his recent promotion, had been superintendent under Mr. Parker since 1940.

Advertising Department Reorganized

Grover M. Herman, president of the American-Marietta Company, Chicago, Ill., announced that two changes have been made in the advertising department to meet the requirements of the company's expanding advertising plans. Robert A. Ornberg, who has been advertising manager, is now sales promotion manager. Relieved of all detail work, he will arrange plans for postwar promotion, handle publicity and create all advertising material for the company's various divisions.

John M. Stiller, printing buyer for several years, becomes advertising manager and assumes all departmental responsibilities for personnel, direct mail and advertising distribution, in addition to his regular production and purchasing duties.

CLEAN
COMPRESSED AIR



● Universal Air Filters have proven their superiority over many years' use on compressed air lines for removing condensed moisture, oil and other impurities.

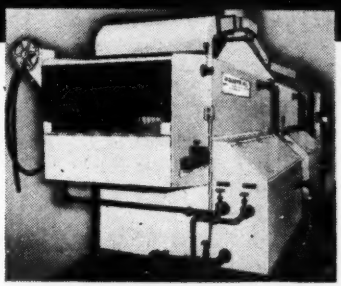
The synthetic porous stone used as a filter medium (in addition to the well-known principle of centrifugal action) causes this filter to deliver pure, dry air for process use by the leading Industrials of the United States.

Two filter stones are furnished with each unit to assure continued operation during simple cleaning process. Maintenance is easy and inexpensive.

Write for detailed information and circular.

UNIVERSAL FILTER COMPANY
Manufacturers
7025 Manchester Ave. • St. Louis, Mo.

INDUSTRIAL
WASHING MACHINES



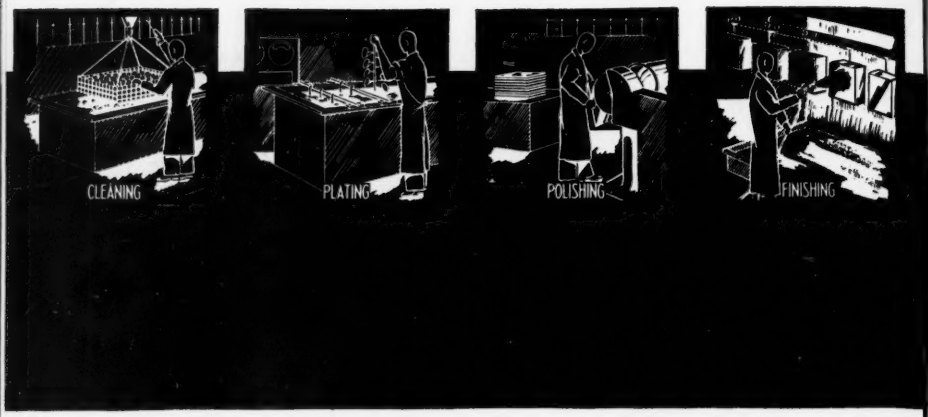
.. for fast and efficient cleaning of vital parts!

INDUSTRIAL Washing Machines—extensively used in ordnance plants throughout the country—are facilitating handling and machining operations in all phases of industry. Included are washing, rinsing, slushing and drying types, and any combination of these.

INDUSTRIAL Washing Machines utilize a minimum of floor space, and are completely self-contained. Our engineers are available for collaboration in the solution of washing and cleaning problems.

WRITE FOR LITERATURE **INQUIRIES ARE INVITED**

INDUSTRIAL WASHING MACHINE CORPORATION
291 BURNET ST., NEW BRUNSWICK, NEW JERSEY



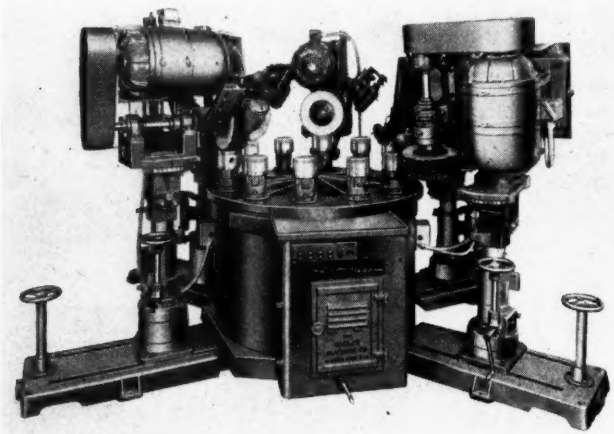
No. 2 Packer-Matic

The illustration presents a 12-station rotary automatic indexing polishing and buffing machine, designated as the No. 2, which has been placed on the market by The Packer Machine Company, Meriden, Conn. All electrical push button controls, including master "stop" button for all motors, are mounted at the operator's position and all magnetic starters are mounted in a dustproof cabinet at the rear of the pedestal. All moving parts beneath the work table and those used for driving the machine are contained in a dustproof oil reservoir to provide proper lubrication and long life of the parts.

The pedestal is designed to enclose the variable speed motor drive unit for indexing the work table. Variable speed unit permits the 3-to-1 ratio for the operation of the work table and the change of speed can be easily made by a conveniently located handwheel.

There are 12 ball bearing chuck spindles, five of which are always in working position with two in loading and unloading position. Packer-Matic automatic expanding or contracting chucks for holding work or for holding the pistons are mounted on work spindles. The maximum size of work that can be handled on the No. 2 Packer-Matic is 12-in. diameter.

From one to five wheel stands can be furnished, with wheels mounted either on the motor spindle or on multi-V-belt driven ball bearing spindles. The V-belt driven spindles allow the changing of speed of wheels. All wheels can be set at any degree from horizontal to vertical, and also swivel in various positions. Packer-Matic wheel stands are individual units which can be quickly attached or detached, according to customer's particular requirements. The No. 2



No. 2 Packer-Matic

machine is shown with three horizontal and two vertical heads arranged for buffing aircraft engine pistons.

Poroseel

The Pemco Corporation, Baltimore Md. (heretofore known as the Porcelain Enamel and Manufacturing Company), announces the marketing of a non-organic coating for metal under the trade name of "Poroseel." One of the outstanding features of Poroseel is the broad range of colors in which it is available. While it is possible for the five basic colors—white, brown, gray, olive drab and blue—to be sufficient for average requirements, it can probably be matched in any color without distracting from the efficiency of the performance of the product.

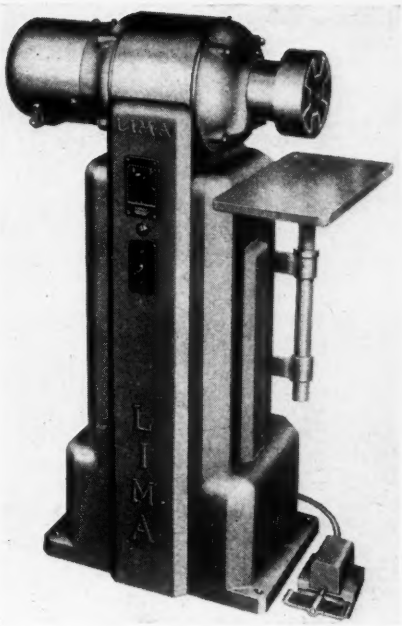
Poroseel is not a paint, although it can be used in one or two coats on sheet steel, malleable or cast iron either by spraying or dipping. Although it is non-organic, it is in no manner similar to porcelain enamel.

Tests conducted under normal plant operating conditions indicate that Poroseel has a very high resistance to heat, even though it matures at low temperatures ranging from 250 to 750 deg. F., which enables its application to the lighter gauge metals without distortion. Poroseel is highly resistant to corrosion, acids, solvents, heat (remains intact at temperatures in excess of 1100 deg. F.) and abrasion. It is also non-toxic, homogenous and odorless. Poroseel-treated steel is of special interest now because of the conservation of critical materials, and will also find a number of applications in the manufacture of postwar products.

Lima Magnetic Polishing Lathe

Designed for the specific purpose of speeding production by eliminating the difficulties encountered in holding odd shaped parts or sections for polishing, burring or lapping, a magnetic polishing lathe which is available in either a pedestal or bench type is now being offered by The Lima Electric Motor Co., 162 Findlay Rd., Lima, Ohio. The unit has a capacity for parts 1½ in. in diameter and up, and is said to be especially suitable for parts requiring a high finish.

The Lima magnetic polishing lathe is furnished with either a single or two-speed drip-proof motor, two or three



Lima Magnetic Polishing Lathe

phase, with speeds up to 3,600 r.p.m. A self-contained rectifier unit is used to supply direct current to the chuck. Faceplate and register plug of the machine are of an interchangeable type, thus making the lathe readily adaptable to various types and sizes of work.

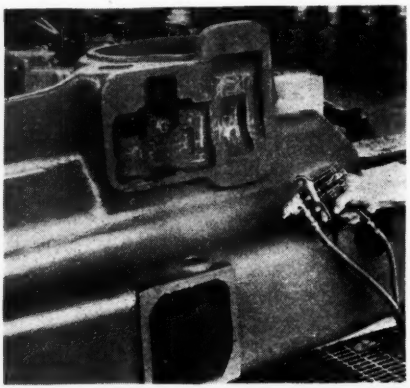
A foot-pedal control device, which can be located in any position convenient to the operator, is used for controlling the operations of the machine. Actuation of the device by foot magnetizes the motor, stops the motor, and demagnetizes the chuck, thereby allowing operator free use of both hands for handling and processing the work. A magnetic disc-type brake for rapid stopping of the motor and the chuck is supplied as standard equipment unless otherwise specified.

A swinging table, which can be raised or lowered to allow for use of different diameter chucks and is adjustable to any position convenient for operator, is attached to the pedestal of the lathe and holds the parts or pieces to be processed. Other features of the machine include a ball bearing spindle, dust-tight heavy duty bearings, easy ac-

cessibility for inspection of all parts, and compact construction for convenience of location and flexibility of operations.

Sherwin-Williams "Pebble" Finish

The Sherwin-Williams Company, Cleveland, Ohio, has recently developed a "pebble" finish for machine tool surfaces. It is claimed that the finish not only uses less finishing materials, but



Application of "Pebble" Finish to a Casting

can be applied in one-third to one-half less time.

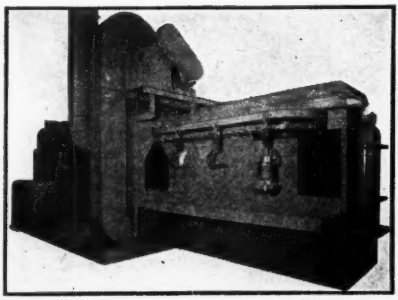
Called a "pebble" finish because of its physical appearance, this method of protecting machine tool surfaces provides a successful solution to the problem of how to "dress up" a machine surface without fillers, sanding and numerous coats of sealing paint. WPB officials, in an effort to boost tool output, have prohibited the use of fillers, sealers and similar finishing materials and have also restricted the number of coats of paint that can be applied. With the pebble finish, however, it is now possible to finish a machine tool in three operations instead of seven as formerly required. It will be noted in the accompanying illustration of a finishing operation on a radial drill that the pebble finish effectively hides the scratches, grinding scars and other surface defects shown at the left of the casting. It is thought that this unusually successful application of pebble finishing will help accelerate post-war planning for improved industrial finishes.

Fostoria Model MF-240-N Fluorescent Lighting Unit

Instantaneous starting of fluorescent lighting units has certain advantages in many industrial plants. To meet the need for lighting units of this type, The Fostoria Pressed Steel Corporation, Fostoria, Ohio, has introduced the MF-240-N fluorescent lighting unit as an addition to the line of Generalite equipment for illuminating work area surroundings. When used in conjunction with Localites for lighting critical work areas, "balanced" lighting results. The Model MF-240-N eliminates the use of starting switches. It provides average lumen output, low voltage operation and satisfactory lamp life.

Elimination of starting switches cuts down maintenance costs resulting from replacement; it also means that there is no blinking of lamps when their life is near end. Instead, the lamps will operate without blinking for the satisfactory number of hours and then fail instantly.

The lumen output for the MF-240-N is



HYDRO-FLOW
INDUSTRIAL WASHING MACHINES

Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

INTERNATIONAL CONVEYOR & WASHER CORP.
Write for circular.
640 E. FORT ST. DETROIT, MICH.

BUCKINGHAM COMPOUNDS

NOW USED IN

WAR PRODUCTION

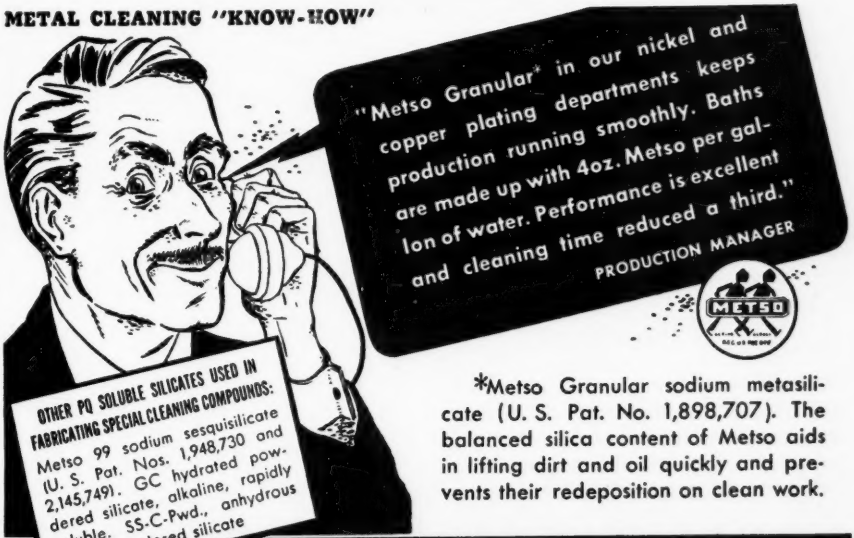
BURRING • GREASELESS
HARDENED STEEL COMPOSITION

Samples Shipped Promptly

The Buckingham Products Co.

8900 HUBBELL AVENUE DETROIT, MICHIGAN

METAL CLEANING "KNOW-HOW"


"Metso Granular* in our nickel and copper plating departments keeps production running smoothly. Baths are made up with 4oz. Metso per gallon of water. Performance is excellent and cleaning time reduced a third."
PRODUCTION MANAGER
METSO
OTHER PQ SOLUBLE SILICATES USED IN FABRICATING SPECIAL CLEANING COMPOUNDS:
Metso 99 sodium sesquisilicate (U. S. Pat. Nos. 1,948,730 and 2,145,749). GC hydrated powdered silicate, alkaline, rapidly soluble. SS-C-Pwd., anhydrous powdered silicate

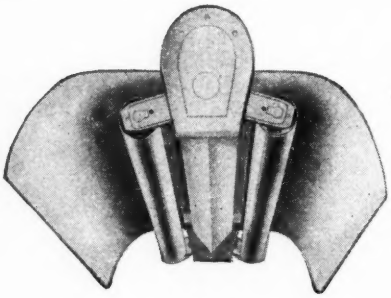
*Metso Granular sodium metasilicate (U. S. Pat. No. 1,898,707). The balanced silica content of Metso aids in lifting dirt and oil quickly and prevents their redeposition on clean work.

PHILADELPHIA QUARTZ COMPANY

GEN'L OFFICES: IONIC AND THIRD STS., PHILA., PA. • 9 PLANTS • DISTRIBUTORS IN 65 CITIES

approximately the same as the MF-240 or any other two-lamp 40-watt unit powered by conventional ballast, which is 4,200 lumens when using 3,500-deg. white lamps. Low voltage operation is important where there is a fluctuation in line voltage. This unit will continue to operate even though the voltage drops momentarily below 50.

The MF-240-N operates on a power factor of 98 per cent at 118 volts and is



Fostoria Model MF-240-N Fluorescent Lighting Unit

connected for stroboscopic effects. It is designed to accommodate two 40-watt fluorescent lamps mounted on 5-in. centers and is built to conform to Bureau of Standards recommendations. Finish on the unit, both inside and out, is gloss white synthetic enamel, baked hard and marproof by near infra red and easily cleaned with soap and water. It is said that the outside white finish will increase attention to maintenance and, consequently, insure that inside surfaces are also kept clean for maximum light reflectance.

Plast-Anneal

Further evidence of the widening range of application of plastics is seen in the announcement of the development and use of a plastic protective coating known as "Plast-Anneal" by the Allen Corporation, Detroit, Mich., ventilation engineers and manufacturers of ventilating equipment.

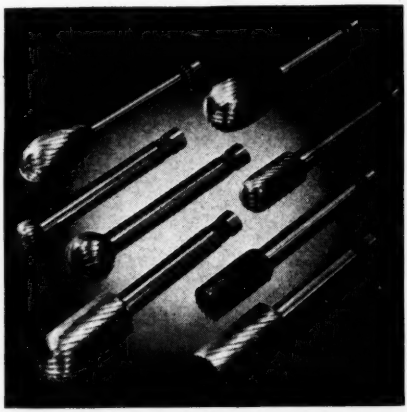
Plast-Anneal coating is said to have a minimum salt spray resistance five times greater than galvanizing; other advantages claimed for it include a true colloidal suspension of color pigment, rust inhibitor, and plastic that insures a uniform distribution of covering and uniform thickness of durable surfaces.

The material is applied after fabrication, thus covering and protecting all surfaces and interstices of the various ventilating units built by the company. The basic formula can be altered to produce an adequate protection for almost any requirement where atmospheric conditions present known concentrations of acid or alkaline solutions; the plastic coating can thus be tailor-made for the job.

Carbur Cemented-Carbide Rotary Files

Carbur, Incorporated, Lincoln Park 25, Mich., announces the addition of six tools to their standard lines of cemented-carbide rotary files. They are available in three shapes, each of which is furnished in two sizes. The new shapes are illustrated here with the two ball-end types originally introduced to the trade.

All of these tools have cutting teeth ground from the solid. Because of the wear-resistance of cemented-carbides, these rotary files offer increased tool life. As they provide a sharp cutting edge over a long period of time, they are said to reduce burring time per part



Carbur Cemented-Carbide Rotary Files

and generally increase efficiency in burring operations in all types of production. Less replacement is necessary and inventories of rotary files can be reduced considerably. Tool sharpening is

Protect your work with **BLACK MAGIC**

"THE ONE BATH PROCESS"

A *QUICK*, inexpensive finish for steel.

Black-Magic is approved on all contracts calling for "black oxide," "alkali black" or "chemical black."

Black-Magic has worked three shifts on War work in many high ranking plants for three years or more, without breakdown. "1,600,000 machine gun magazines without a rejection" says one superintendent.

We guarantee satisfactory production and maintain service free of cost.

Other black oxide processes for Brass, Copper and Zinc.

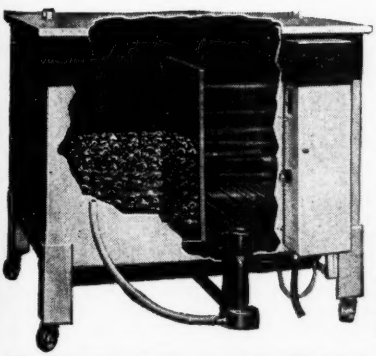
WITCH-DIP—a rust resistant final finish.

SILCO —the latest name in protective coatings. Rust, abrasion, impact and acid-proof.

Write for free portfolio "Black-Magic" and related products.

MITCHELL - BRADFORD CHEMICAL CO.
BRIDGEPORT, CONN.

NEW Improved
Vapor Degreasing



Speeds Up Vapor Degreasing by More Than 33⅓% -- Safer, More Economical

Developed by Phillips, PHILLSOLV vapor degreasing solvent is tops for efficiency. It cuts vapor degreasing time by one third! Reduces vapor loss. Handles wider range of greases. Gives more thorough penetration of close, nested parts of ferrous and non-ferrous metals. Low toxicity—higher safety factor.

Complete Line of Electrical
VAPOR DEGREASING MACHINES
A machine for every type of job. Portable—can be moved to the job. Require no gas, water or steam lines. Many other features. Write for catalog.

Write for FREE Degreasing Manual!

PHILLSOLV, non-water soluble, has many applications in instrument and war plants. No corrosive action. Write today for FREE manual on Vapor Degreasing telling how to use this new process. Also for catalog of Phillips Electrical Vapor Degreasing machines.

PHILLIPS Manufacturing Company • 3456 W. Touhy Ave., CHICAGO, ILLINOIS

reduced in proportion to the life of the tool. An important factor in the reduction of finishing time is the fact that these tools can be run at unusually high speeds.

Enthone Emulsion Cleaners

The Enthone Co., New Haven, Conn., has announced the development of two emulsion cleaners. One material, called Enthone Emulsion Cleaner, is an emulsifiable solvent in the ready-to-use condition. The cleaner is designed for rapid

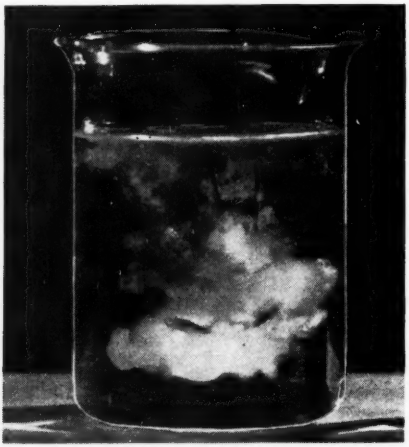


Illustration showing emulsion cleaner on immersion of work in cold water; notice the rapid dispersion of the cleaner with absence of jelling.

cleaning of oil, grease and solid dirt without attack on any basis metal including zinc, aluminum, brass, lead and steel. The use of the cleaner is said to enable fast, complete cleaning of very oily or dirty work, giving adherent, bright and less porous electrodeposits and adherent organic finishes. A saving in alkali cleaner is also claimed. The work to be cleaned is swished about in the cleaner and is then rinsed off in running cold water, which emulsifies the cleaner with all of the dirt. A very short immersion in an alkaline cleaner following this prepares the work for finishing.

The cleaner is said to be of high penetrating power, to have high emulsifiability, and to rinse rapidly and completely. Its flash point is above 100 deg. F., and is has no strong disagreeable odor.

The other emulsion cleaner is called Enthone Emulsion Cleaner Concentrate, which is a base of strong emulsifiers that is mixed with from 9 to 15 volumes of solvent naphthas and used in the same manner as the emulsion cleaner. The base enables the obtaining of emulsion cleaners at a somewhat lower cost for users of large amounts of emulsion cleaners.

Speare's Safety Siphon

A safety siphon for discharging acids and chemicals from carboys, drums and

Speare's Safety Siphon

barrels, the design of which utilizes the safe vacuum principle, has been placed on the market by Pulmosan Safety

For a real good polishing job use

KEYSTONE EMERY

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa

QUESTION: Why Does Paint Chip and Peel From "Hot" Galvanizing?

ANSWER: Galvanized and Zinc-plated surfaces require paint for lasting protection, since in most instances the protective value of galvanizing or zinc-plating is not sufficient to insure preservation.

Paint will not ahrere to "hot" or untreated zinc-coated or galvanized materials because of surface characteristics and alkalinity. Without proper "cooling" and preparation for paint, chipping and peeling result, thus destroying the whole purpose of painting—metal protection.

TURCO REDI-PAINT passivates these surfaces. It effects the necessary chemical change by neutralizing alkalinity, roughening surface slightly for an anchor point for paint, making the metal resistant to corrosion, forming an inert film which will not become alkaline.

TURCO REDI-PAINT speeds production by its easy application, by hand or by tank immersion. It eliminates unnecessary backtracking because of its easily distinguishable dark color, while rapid drying permits quicker handling for further processing.

Call the Turco Technical Service Man in your vicinity or write for further information regarding TURCO REDI-PAINT.

TURCO
PRODUCTS, INC.

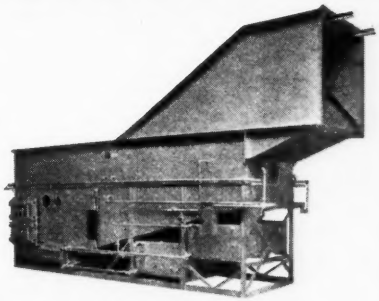
SPECIALIZED INDUSTRIAL CHEMICAL COMPOUNDS

MAIN OFFICE & FACTORY: 6135 SO. CENTRAL AVE., LOS ANGELES 1,
CHICAGO OFFICE & FACTORY: 4856 SO. HALSTED ST., CHICAGO 9
SERVICE MEN AND WAREHOUSE STOCKS IN ALL PRINCIPAL CITIES

BLAKESLEE DEGREASERS
SPEED-UP PRODUCTION

Maintain production and obtain 100% grease-free metal surfaces with Blakeslee Degreasers. Efficient engineering design and construction insures production and *lowest* solvent operating costs.

We would welcome the opportunity of discussing the application of Blakeslee Degreasers or Metal Parts Washers with you and just how your production may be speeded and cleaning costs cut. An engineer will be pleased to call on you without obligation on your part.



G. S. BLAKESLEE & CO.

NEW YORK — CICERO STATION CHICAGO — TORONTO

Equipment Corporation, 176 Johnson St., Brooklyn, N. Y. The siphon consists of acid-resistant casing which is inserted into the carboy, flexible Saran plastic siphon tubing, and a positive flow control valve at the pouring end. The simple pumping action of the tubing inside the casing generates steady flow. It is claimed that the siphon has no glass parts which can break, requires no bulbs or auxiliary pumping apparatus, cannot be over-primed or over-filled, and does not build up dangerous pressures. The materials used in the construction of the siphon have been fully tested for sulfuric. nitric, hydrochloric (muriatic), sulfurous, glacial acetic, and acetic acids; bleaching solutions, and many other chemicals.

Regan Radiant Heater and Resistor

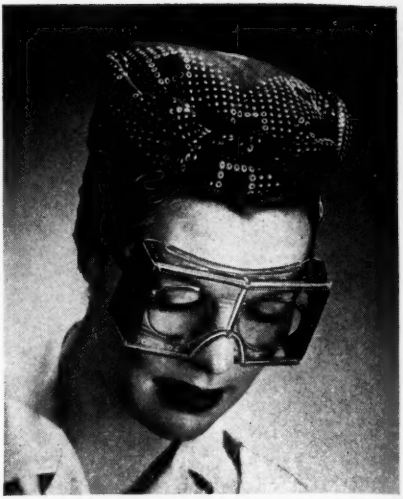
Techtmann Industries, Inc., 828 N. Broadway, Milwaukee, Wis., announce the development of the Regan radiant heater and resistor, which has proved through actual installations that its core will not deteriorate at temperatures up to 1700 deg. F.

Regan Radiant Heater and Resistor

Designed for use in annealing ovens, electric furnaces—wherever high temperature radiant heat is required—the Regan radiant heater also serves as a resistor. The element consists of a helical coil of nickel chromium wire wound spirally around the refractory core. The binding posts and straps are of Monel metal or nickel chrome, depending upon the user's specifications. It is obtainable in a range from 32 to 220 volts.

"Eye Savers"

An efficient, all-plastic goggle which features Plexiglas lenses has been placed on the market by Watchemoket Optical Co., Providence, R. I. It is claimed that the lens material is crystal clear, nondistorting, and will not shatter or splinter under impact.



Eye Saver Goggles

The goggle fits directly over prescription glasses, and the full frame gives added protection against injury from the sides, top and bottom. The lenses can easily be removed for cleaning or replacement. The frame is strongly reinforced with a metal clip at the bridge, and is amply ventilated to prevent fogging. The goggle is exceptionally light, weighing only 1¾ oz.; this is said to be an especially important feature with women workers. Snap-in filters are available for torch welding or cutting, and other glares.

L & R "General" Precision Cleaning Machine

Especially designed for use in the production of electronic tubes and related devices, the L & R "General" precision cleaning machine shown in the accompanying illustration has been added to the line of self-contained cleaning units for cleaning, rinsing, polishing and drying small metal parts marketed by the L & R Mfg. Co., 54 Clinton St., Newark, New Jersey.

Arranged for easy operation by women workers, the machine is equipped with

a powerful air-cooled fractional horsepower motor and a work basket 2¼ in. deep x 3⅝ in. inside diameter, together with nesting basket having three compartments. By snapping on the thermo-

L & R "General" Precision Cleaning Machine

static switch of the unit, a surging centrifugal motion of the work basket is produced, with speeds varying from high to low. Dull, greasy, oil-stained workpieces are said to emerge from the machine bone dry and ready for the assembly line.

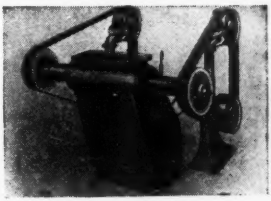
"Vapor" Pressure Switch

The Vapor Car Heating Company, 80 E. Jackson Blvd., Chicago, Ill., has developed an exceptionally compact pressure switch designed for controlling pressures in liquids, air or gases. It is suitable for operation at pressures up to approximately 100 lb., and is said to have a high degree of accuracy.

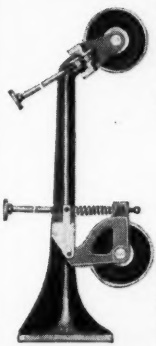
The switch operation depends upon the effect of pressure on a specially designed spring-compensated bellows

The New
JONES
BACKSTAND IDLER
NO. 120

For Faster Grinding and Polishing



Converts Your Lathe to Fast, Smooth, Even ABRASIVE BELT GRINDING



Ideal for crowded grinding and polishing departments, the Jones Abrasive Belt Backstand Idler No. 120 takes a minimum of floor space to convert your present lathe to fast, uniform, low-cost abrasive belt grinding.

- *Uses Minimum Floor Space*
- *Conveniently Located Controls*
- *High Speed—Fast Production*
- *Easy to set up*

Note the simple arrangement above, using a regular lathe and two Jones Backstands. *Bulletin No. 120* gives complete details.

JONES ENGINEERING COMPANY
DEPT. B-2
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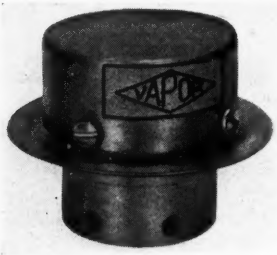
that operates a unique snap-action beryllium copper switch. The switch is designed for reliability and ruggedness



"Vapor" Pressure Switch

with the main emphasis on accuracy. It can be used for either direct current or alternating current.

New Literature

"Porcelain Enamel, the Lifetime Finish." Useful data for product engineers, designers and others interested in the use of porcelain enameled iron are presented in a booklet published by The American Rolling Mill Company. Engineering information is given on the abrasion and friction resistance, weather resistance, resistance to chipping, resistance to thermal shock, color fastness and range, finishes available, chemical resistance and physical properties of porcelain enamel. Drawings are used to illustrate several of the "do's" and "don'ts" of designing products that are to be porcelain enameled. Copies of the data book may be obtained by writing The American Rolling Mill Company, Middletown, Ohio.

Power Plant Digest. Of interest to engineers, superintendents and other executives responsible for power plant maintenance in aircraft factories, ordnance plants, steel mills, foundries and other metal-working plants is a 16-page digest released by Oakite Products, Inc.

Based upon the average successful experience of over 300 steam, internal combustion and central station plants, the digest concisely describes 65 problems and jobs that commonly occur in power plant maintenance. Various methods are outlined, materials and amounts used given, results obtained, and advantages gained. In addition to the many diversified types of work and operations discussed, such as degreasing, paint-stripping, salvaging and rust removal procedures, the manual contains many useful diagrams and hookups successfully being used for cleaning and descaling heat exchange equipment.

The digest is prepared in data sheet form and is indexed to facilitate ready reference. Write to Oakite Products, Inc., 20 Thames St., New York 6, N. Y.

Chart of Plasticizers and Softeners. A series of plasticizers and softeners for use in coatings, adhesives, plastics, cellulose esters and ethers, synthetic resins and synthetic rubbers, is now being produced commercially. They consist of alkyl and alkyl ether esters of higher fatty acids and dicarboxyllic acids. They are characterized by their low freezing points and very mild odors. A chart listing the plasticizers and giving the following physical properties is now available: specific gravity, color, solidification point, acid value, solubility, boiling point, compatibility and odor.

Copies of the chart can be obtained from Glyco Products Co., Inc., 26 Court St., Brooklyn, New York.

Industrial Maintenance Paints. The Valdura line of heavy duty industrial maintenance paints are now listed in a catalog issued by the American-Marietta Company, 43 E. Ohio St., Chicago, Ill. Fully illustrated, the catalog provides application suggestions, product descriptions and technical data in complete detail. Attractively printed in two colors, it is easily handled and filed. The maintenance man or purchasing agent can plan his paint requirements and know the characteristics of drying, coverage and application by using this handy ordering catalog.

Munsell and Ostwald Color Systems. According to a recent announcement by General Printing Ink Corporation, the issuance of the "Color Standards" folder, which presented a check-list of 34 color systems and color standards widely used in American industry and science, has resulted in many requests for detailed information concerning a num-

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Rayco Flock is textile fibres cut to extremely short uniform lengths, applied by adhesive to form a solid, even coating.

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ber of the systems mentioned therein. In time they hope to satisfy all of these requests.

As a starter, a 21-page booklet which contains a comprehensive description of the two major systems of color — the creations of Albert H. Munsell and Wilhelm Ostwald—has been prepared. After studying this little booklet, even the average layman should not find it difficult to apply these systems to his own needs. The booklet also offers some interesting data on The Elements of Color by Faber Birren, an outstanding authority on color.

A copy of this informative booklet is available upon written request to General Printing Ink Corporation, 100 Sixth Ave., New York 13, N. Y.

Promat Process. A technical booklet, illustrating and fully describing the Promat Process of electroplating, which is said to provide improved anode characteristics and increased cathode efficiency, has been prepared by the Promat Division of Poor and Company, 851 S. Market St., Waukegan, Ill. Copy of the booklet will be sent free upon request to any electroplater.

G-E Electric Furnaces for providing controlled, precision heat-treatment are discussed in detail in an 82-page catalog (GEA-4049) recently issued by the General Electric Company, Schenectady, N. Y. Extensively illustrated, the bulletin describes the many types of electric furnaces made by General Electric, indicates the applications for which each type is most suitable, and presents outline drawings showing construction details of furnaces typical of those described.

The final section of the publication is devoted to descriptions and illustrations of various types of standard and special control equipment for electric furnaces. Copy free upon request.

"Are You Fitted for Fighting" is the title of a folder issued by Prack Laboratories, Inc., 132 W. 21st St., New York, N. Y., which discusses occupational dermatitis and Practi-Kreme, a protective cream which has been developed to prevent skin trouble. It is said that Practi-Kreme maintains its complete protective properties for many hours without drying, roughening or chapping the skin. The folder also describes other industrial protectives made by Prack Laboratories. Copy free upon request.

Instruction Manual. Technical supervisors, metallurgical engineers, works managers, factory superintendents and other production executives responsible for the production of ordnance matériel and other essential war supply items will find in a 12-page illustrated instruction manual issued by Oakite Products, Inc., latest technical data for ridding ferrous and non-ferrous parts of deposits that require a special type of acidic action to remove them.

This specially-prepared manual describes how a recently developed, acid-detergent material, known as Oakite Compound No. 84, which is usually applied after thorough alkaline degreasing, successfully solves these cleaning and related problems on such varied production operations as the following: removing oxide films and stains as well as light rust from steel; detarnishing and brightening brass and copper; safely ridding aluminum surfaces of oxide and heat treat films; preparing aluminum for anodizing; cleaning before application of Alrok finishes; stripping anodizing from aluminum work racks and rejects; and tumbling small steel parts. Also given is data on cleaning factory, foundry and mill skylights and windows with this material where rust, carbon, soot, shop dirt and other soils are encountered.

Free copies of this informative manual are available on request; write to Oakite Products, Inc., 20 Thames St., New York 6, N. Y.

Tri-Mur-Lite C-1 Cold Cleaning Process is the subject of a four-page presentation of the important facts about cold cleaning. Issued by Murphy Chemical Corporation, 480 Lexington Ave., New York, N. Y., the folder is a concise description of Tri-Mur-Lite C-1 and an explanation of its use in cleaning and degreasing operations. Copy of this folder free upon request.

Lithorizing, a process which makes paint stick to galvanized iron and other zinc or cadmium surfaces, is explained

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in detail in a four-page folder, designated as Technical Service Data Sheet No. 7-2-5, issued by American Chemical Paint Company, Ambler, Pa. The Lithorizing process makes use of a non-inflammable liquid chemical known as Lithoform. Lithoform is easy to apply, the essential apparatus being a bucket and brush. One gallon of Lithoform is designed to cover approximately one thousand square feet of surface. Copy free upon request.

Paint Spraying Rules. A wall chart of paint spraying rules showing how to save paint, air, time, power, fuel and equipment, reduce time lost because of sickness or accident, and improve results, has been published by the Eclipse Air Brush Co., 400 Park Ave., Newark 7, N. J. The rules apply to all types of spray equipment—not necessarily to that made by Eclipse. The chart will be sent free to anyone requesting it.

War Specification Products—lacquers, varnishes, enamels and synthetic resins which are the products of Jones-Dabney Company, Louisville, Ky.—are discussed in relation to Government specifications in a comprehensive booklet. It is designated as War Specification Products Booklet No. 3.

The book is divided into sections, some of which are listed here: U. S. Army, U. S. Army (Tentative), Quartermaster Corps, Tank Automotive Center (U. S. A. Ordnance). Corps of Engineers, Navy Ordnance, Aviation Specification Finishes (Army-Navy Aeronautical), U. S. Maritime Commission, and so on. A copy of the booklet will be sent to any finishing plant executive who addresses a request on his company letterhead.

Electronic Tubes. A 24-page non-technical book titled "How Electronic Tubes Work" has been produced by the General Electric Electronics Department. It is designed primarily for industrial engineers. Illustrated with 117 sketches and photographs, the book is a primer whose main emphasis is on how the electronic tube operates. The eight basic types of industrial electronic tubes and their uses are described. The book (GEA 4116) is available free on request to Dept. 6-215, Publicity Divisions, General Electric Company, Schenectady, New York.

Hammond Cylindrical Finishing Machine. Bulletin No. 502, illustrating Hammond Cylindrical Grinding, Polishing and Buffing Machines, is announced by Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo 54F, Mich. It gives complete detailed information for fast, efficient finishing of ¼ to 9-in. outside diameter tubes, rods, bars and a wide variety of cylindrical shapes.

The bulletin describes and features the relatively standard unit which can be adapted either for use with grinding, polishing and buffing wheels, or arranged for contact-wheel and abrasive belts with the Hammond backstand-idler. This flexibility in arrangement for various grinding, polishing or buffing operations is fully disclosed. A copy of the bulletin may be obtained on request.

Polyvinyl Acetate. Polyvinyl acetate, a plastic widely used as an adhesive and binder, is described in a bulletin entitled "Polyvinyl Acetate; Solid, Solution & Emulsion Forms," issued by the Electrochemicals Department of E. I. du Pont de Nemours & Company. The bulletin describes the properties, applications and other information about the plastic. It has been coded No. 4-243 and copies may be obtained from the Electrochemicals Department, Du Pont Company, Wilmington, Delaware.

Bright Zinc Plating Methods. A 14-page technical report on bright zinc plating as a substitute for cadmium plating has been issued by Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Calif. The mimeographed report gives complete descriptions of still and barrel plating, using a choice of three precleaners—Turco Penetrol, Turco Supertrol or Turco Composition L-570—and, as the final cleaner, Turco Porokleen. It will be of special interest to electroplaters and to the metal trades, and is available upon request without cost.

Because the supply of cadmium is now critical, even for the most essential operations, cyanide zinc plating is replacing cadmium plating in many industries, according to the report. The new zinc cyanide baths are said to have a relatively high throwing power, provide a corrosion-resistant plate as effective as cadmium, and produce an attractive bright plate.

Since successful adhesion of electroplated deposits depends upon a chemically clean steel surface, a pre-cleaner

is essential to remove oil, grease, metallic oxides, mill scale and corrosion products, the Turco report states. Which of the three pre-cleaners will be used depends upon plant facilities, the type of work to be cleaned, and other operating conditions. Turco Porokleen, the final cleaner for plating, can be used either in a still tank or in electrocleaning. Both methods are outlined in the report.

Radiant Heat Drying Lamps. For drying, baking and heating processes, radiant heat drying lamps are recommended in an illustrated booklet announced by Westinghouse Electric and Manufacturing Company.

The 12-page booklet tells what radiant heat is and discusses its advantages: speed, low initial and maintenance cost, flexibility and ease of control, reduced space requirements. Besides discussing the design and performance characteristics of the drying lamp, the booklet takes up the design of radiant heat installations, the arrangement and spacing of equipment, and electrical circuit design. Specific data is given for the three general classes of applications for industrial purposes; namely, evaporation of water or other solvents, paint drying, and increasing temperatures of materials to facilitate manufacturing processes.

A copy of Booklet A-3817 may be obtained from the Westinghouse Lamp Division, Bloomfield, New Jersey.

Insl-X. A 15-minute air-drying synthetic insulation for electrical equipment, known as Insl-X, is the subject of a booklet issued by The Insl-X Company, Inc., 857 Meeker Ave., Brooklyn, N. Y. Insl-X is said to have high dielectric strength, coupled with resistance to moisture, acids, alkalis, petroleum products, abrasive action, corona, light and salt water. A number of typical applications are described, and the specifications and characteristics of Insl-X are given. Copy free upon request.

Photo Copies. American Photocopy Equipment Company, 2849 N. Clark St., Chicago, Ill., has issued a folder which describes and illustrates the Apeco, a machine for making sharp, legible copies of anything which is written, printed or drawn. Copy of the folder free upon request.

Wayne Products. A four-page illustrated folder which describes many of the products of Wayne Chemical Products Company, 9602 Copeland Ave., Detroit, Mich., is now available. Products mentioned in the folder include Protex Non-Rust Oils and Coatings, metal coating compounds, spray booth cleaners, 3B lubricant, and Aqua-Sol Grinding Compound. Copy free upon request.

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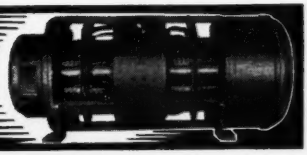

Detrex Degreasers are the subject of a profusely illustrated booklet now being distributed by Detrex Corporation, 13017 Hillview Avenue, Detroit, Michigan. Descriptions and cutaway views of several Detrex degreasers are of special interest. The booklet stresses the fact that the company manufactures machines for every type of solvent cleaning and that the degreasers are engineered to meet any production requirement. Copy free upon request.

Schmieg Dust-and-Fume Control Equipment. An interesting and informative book describing the various Schmieg products has been published by Schmieg Industries, 352 Piquette Ave., Detroit, Mich. Photographic illustrations show actual installations of dust-and-fume control equipment, spray booths, mechanical washers, industrial ovens. Reproductions of blueprints give engineering details, capacities and dimensions of various dust removal units. A section is devoted to sheet metal equipment with built-in systems for removal of fumes or dust in welding, grinding, buffing and similar operations.

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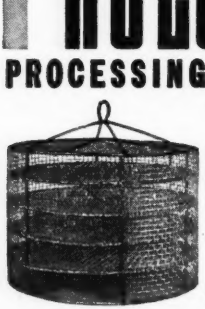

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The book—42 pages in color—will be sent without charge upon receipt of a request on company letterhead.

L & R Cleaning Equipment. The composite answers to a recent questionnaire on the use of L & R precision cleaning machines and solutions are given in an attractive booklet published by L & R Manufacturing Company, 54 Clinton St., Newark, N. J. The booklet also includes illustrations and short descriptions of several L & R products. Copy free upon request.

Burring. A circular which illustrates 18 ways in which the Mead industrial burring machine effects economies in both time and money has been prepared by Mead Specialties Company, Dept. 113-PF,15 S. Market St., Chicago 6, Ill. The booklet also contains a special grit guide. The machine grinds and finishes both outside and inside cutout openings. Copy of the circular free upon request.

Anodex and Metex. Two folders which describe Anodex and Metex special compounds for cleaning are available from MacDermid, Inc., Waterbury 88, Conn. The booklets explain how these fast-acting, hard-hitting compounds speed up and improve pre-finishing or pre-coating operations. Copies will be furnished upon request.

Cleaners for Effective Metal Cleaning. A method developed by Hanson-Van Winkle-Munning engineers for measuring the quantity of available alakali in cleaner baths is one of the features covered in Bulletin C-105, issued by Hanson-Van Winkle-Munning Co., Matawan, N. J. Included also are operating suggestions, a section on metal cleaning processes, descriptions of H-VW-M soap and alkali (both soak and electric) cleaners, charts, grophs, and many helpful suggestions on the selection and control of alkali cleaners. Copy of the bulletin free upon request.

Safety Shorts

World War II is a lot safer than World War I for the American war worker, according to the 1943 edition of "Accident Facts," the statistical yearbook of the National Safety Council.

Deaths per 100,000 workers in the current war are one to one and a half times less than fatalities to war workers in 1917-18, the Council said. The Council also pointed out that the increase from 1941 to 1942 was much less than the rise in deaths from 1917 to 1918.

Railroad workers are twice as safe today as were their predecessors in the last war, and injuries to these workers are only a third as great as a quarter of a century ago.

Agriculture took the heaviest toll last year among war workers, with 4,400 deaths. Trades and service were next with 3,500, followed in order by construction 3,100, manufacturing 3,100, transportation and utilities, 2,500 and mining, quarrying, oil and gas wells, 1,900 deaths.

Occupational fatalities decreased by 200 in the first four months of the present year, as compared with the same period in 1942.

Accidents—97 per cent of them preventable—cost the nation $5,200,000,000 and 380,000,000 man-days of work in 1942.

On-the-job accidents killed 18,500 workers—500 more than in 1941—injured 1,750,000 (150,000 more than in 1941) and resulted in a loss of time sufficient to have built 18,000 heavy bombers or 55 battleships.

All-accident death totals in 1942 (including occupational) were 93,000 killed and 9,200,000 injured.

The lives of 300,000 Americans have been saved since the national safety movement began in 1913.

This is revealed in the 1943 edition of "Accident Facts," the annual statistical yearbook of the National Safety Council.

A box score of accidents contained in the book shows that the death rate has been lowered each year in the 30-year period between 1913 and 1943, except for 1917 and 1936. In 1913 the rate was 85.5 per 100,000 population. Last year it was 69.3.

During the triple decade there were 2,707,000 accidental deaths. If the death rate had been as high each year as it was in 1913, this number would have risen to 3,004,000.

Paisley Labeling and Packaging Adhesives. A four-page folder describing various adhesives developed by the Paisley Laboratories for labeling, wrapping sealing, and other packaging operations in all industries is now being issued by Paisley Products, Inc., 1770 Canalport Ave., Chicago, Ill. Copy free.

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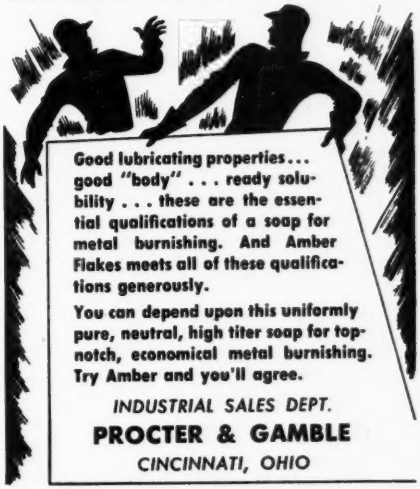

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